the OIL AND GAS JOURNAL

FEBRUARY 4, 1957

JOURNAL ROUNDUP OF

Contractors' role in '57 Pipelining

Here they speak their piece . . . and so do their customers • 105

California Throws Wrench in Offshore Plans • 78

How U. S. Steel Sizes Up Future Drilling • 84

How to Spot Dog-Legs Easily • 128

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... what makes a hole a well?

It takes a few things besides a pay zone to turn a bore hole into a moneymaking producer. One of them is a good primary cementing job. In oil and gas fields everywhere a good cementing job means a Halliburton job. Why? Because of the world's finest force of expertly trained cementing operators. Because of a third of a century of forward-looking research on cements and application techniques. Because of the industry's greatest arsenal of rugged pump trucks and cementing tools. All dedicated to the most profitable wellmaking that modern technology can achieve for every Halliburton customer.

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PROGRESS IN SERVICE THROUGH RESEARCH

Contents on pages 2-3

A Glance Ahead

- **Sizable outlays for offshore pipeline construction**—both crude and gas—are included in 1957 budgets just approved. Crude lines will reduce the steep per-barrel cost of barging offshore oil to coastal terminals. They also will stimulate production from this major new oil province in the Gulf of Mexico.

- **The practice of splitting catalytic reformate** and cat-cracked gasoline into light and heavy streams is spreading. Refiners can easily reach the 100-plus octane level for leaded premium or superpremium by blending heavy reformate with light cat-cracked gasoline. But blending the remainder to regular grade of competitive quality poses a problem for some refiners.

- **Fracturing of water-flood wells** is becoming a safe and profitable operation. To date, fracturing has been successful in about 85 per cent of the jobs done on producing wells and nearly 100 per cent on injection wells. Treatments are kept small—usually several thousand gallons of fluid. Advantages of fracturing in a flood are: A balanced flood, a shorter flooding time, and a faster payout.

- **New well-fracturing techniques** may open up tremendous natural-gas reserves in Rocky Mountain states. One field in Wyoming has reserves estimated at 4 trillion cubic feet or more, but it is now shut in because of tight producing formations. In the last 2 years, improved methods already have greatly increased the output of many wells in the San Juan Basin.

- **Congress is about ready** to get on with the work of the session, after the usual shakedown of organizing committees. With more than 30 bills on oil already offered, the industry can expect to be much in the limelight over the next 6 months. Many bills, of course, will never get anywhere. But enough of them will be taken up to keep the industry watching Washington closely.

- **The drive for import quotas** will pick up speed soon in Congress. The new crude-oil prices make the U. S. an even more attractive market for foreign oil than in the past. Oil and coal producers are fully aware of what could happen once the Suez situation clears up. They don't intend to wait for controls until the government can decide they are needed—after imports have become a new flood.

- **Du Pont soon will be buying ethylene** outside to increase polyethylene production at its Orange, Tex., plant. A 6-in. line will be built this year. It will move ethylene bought in the Lake Charles, La., area.

- **Russia now claims** a fifth of the world's oil reserves "according to the most modest estimates." Yu. E. Maksaryev, vice chairman of the U.S.S.R.'s State Committee on New Technology, made the estimate. "Discovery of new reserves," he added, "may place the Soviet Union first in the world" before long in oil wealth.

- **Iron-oxide units for desulfurizing natural gas** may soon find greater use in the field. The process has been used for years in large plants to clean up manufactured gas. Now a pilot plant operated by Cities Service Gas in the Texas Panhandle is showing 100 per cent sweetening of natural gas in early operations. But a true evaluation of the technique for general field use cannot be made for several months.

The OIL AND GAS JOURNAL

FEBRUARY 4, 1957 • VOLUME 55 • NUMBER 5

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The Oil and Gas Journal, Published Mondays, copyright 1957, by The Petroleum Publishing Co. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. United States and foreign rates to the petroleum industry, 1 year $4, 2 years $7, 3 years $8.

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EXPLORATION • DRILLING • PRODUCTION • FIELD PROCESSING

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TECHNOLOGY—OPERATION

Pipelining

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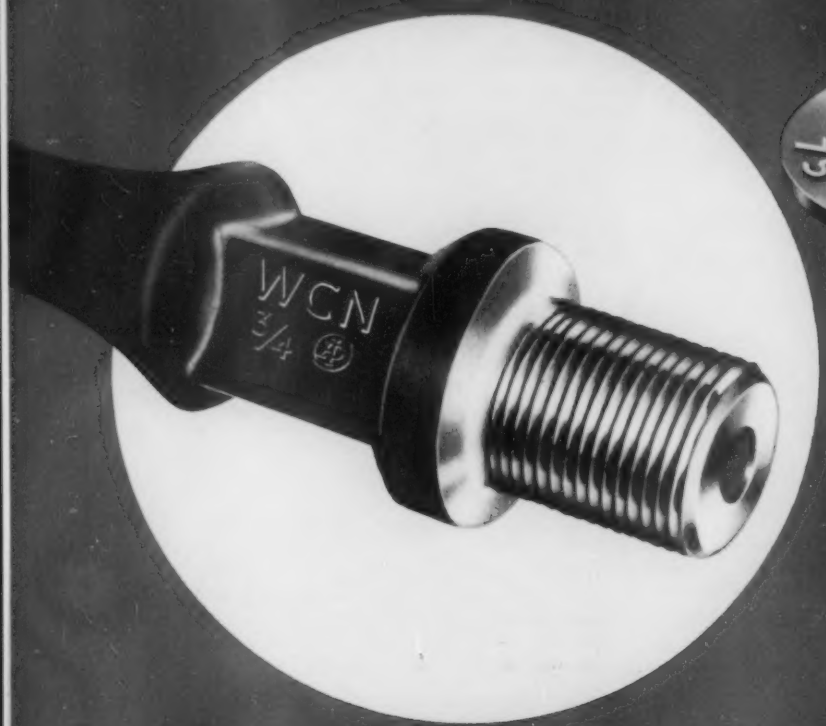

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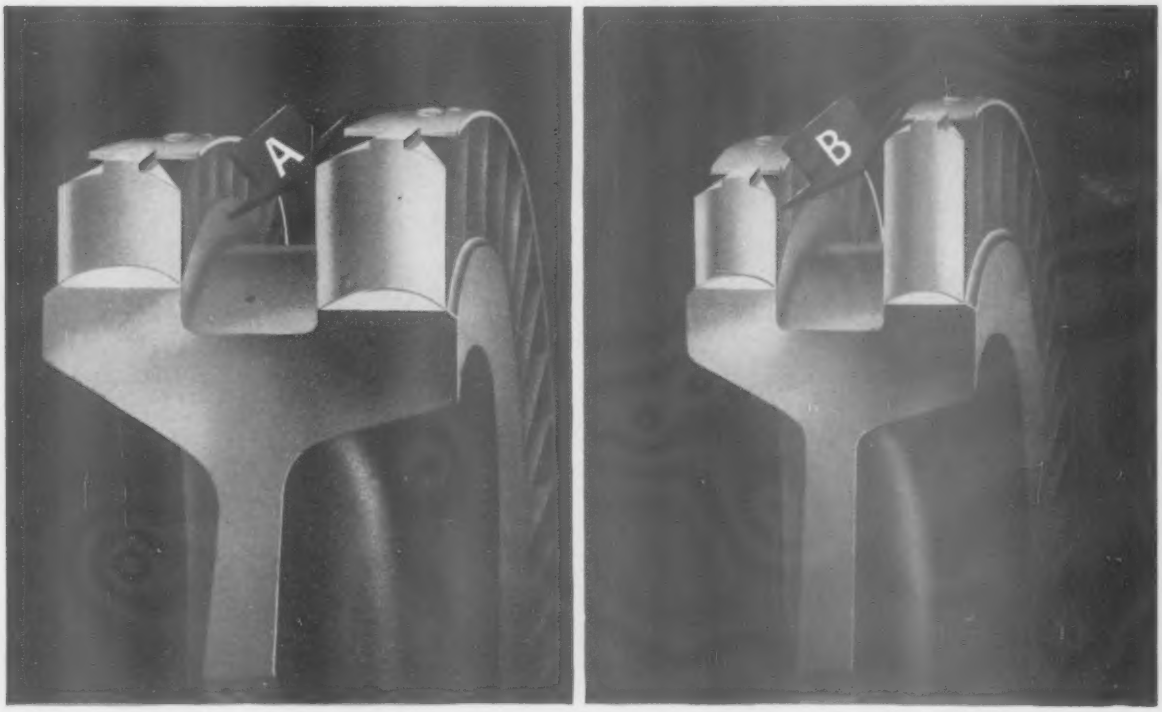

(Left, A) wide bucket "L" type wheel. (Right, B) regular type wheel for Coppus Steam Turbines

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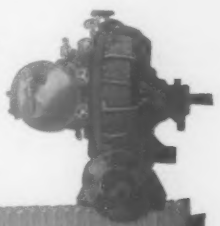

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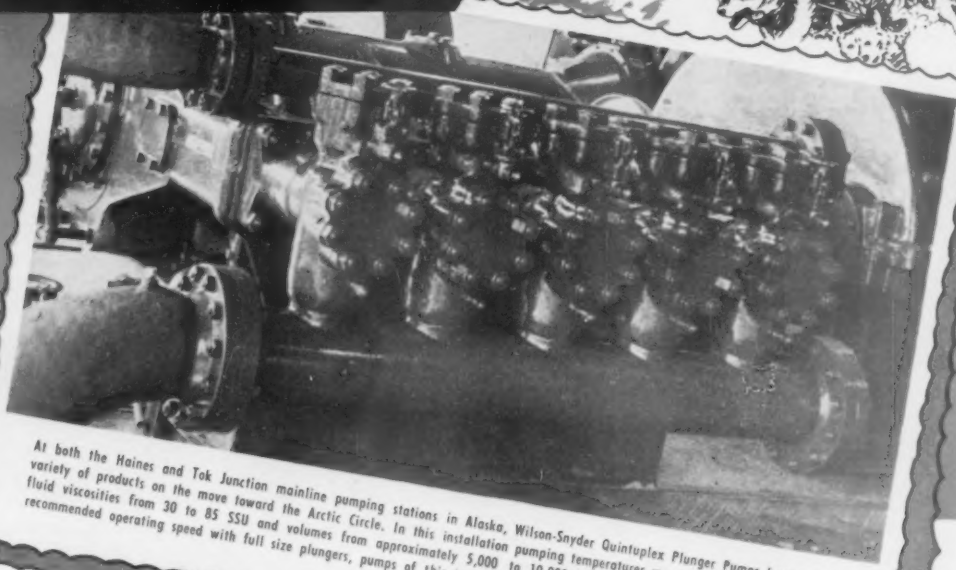

At both the Haines and Tok Junction mainline pumping stations in Alaska, Wilson-Snyder Quintuplex Plunger Pumps keep a wide variety of products on the move toward the Arctic Circle. In this installation pumping temperatures may vary from 80 to —20° F., fluid viscosities from 30 to 85 SSU and volumes from approximately 5,000 to 10,000 bpd per pump at 1,200 psi. At maximum recommended operating speed with full size plungers, pumps of this type are capable of handling up to 17,500 bpd at 1,270 psi.

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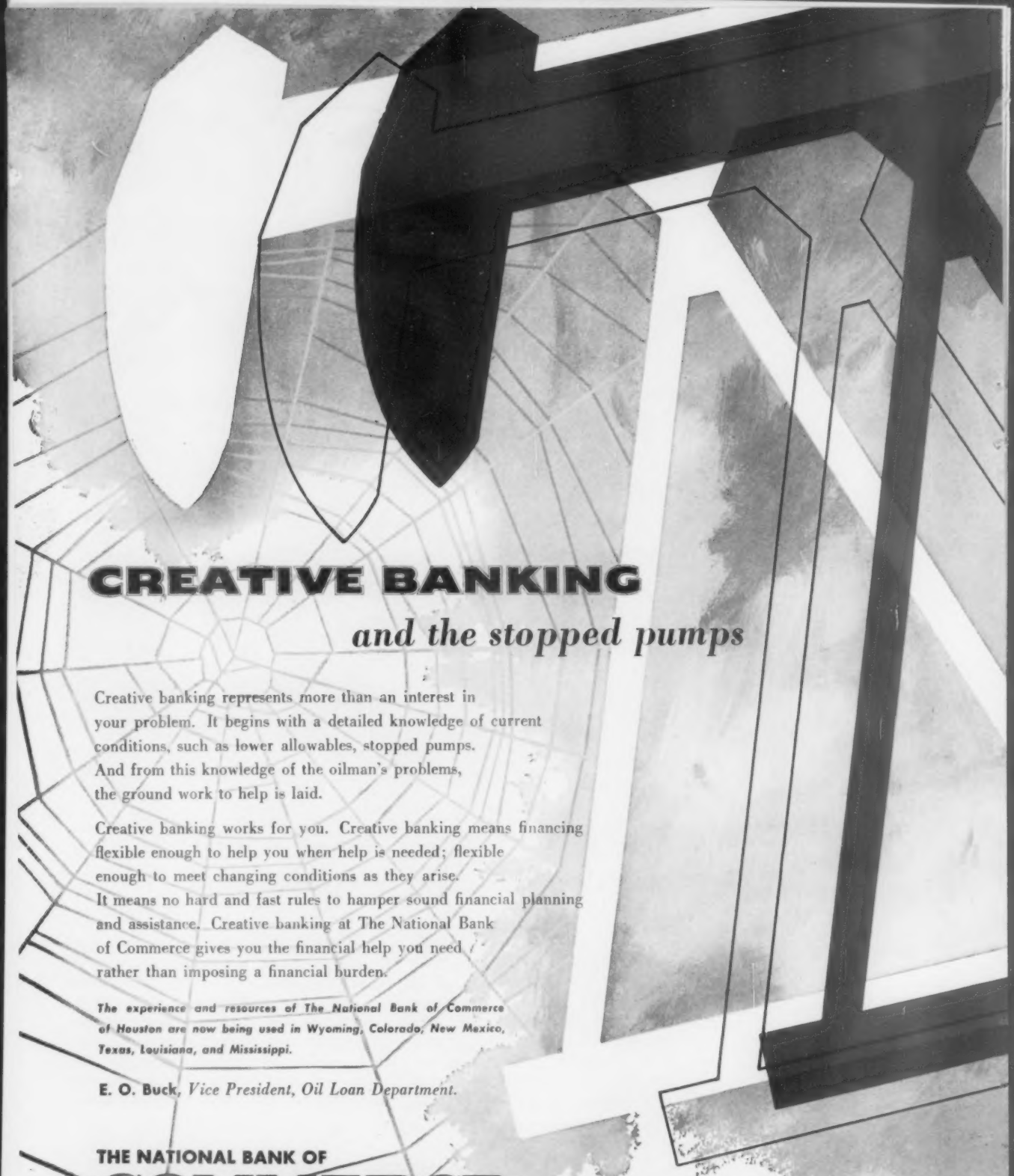

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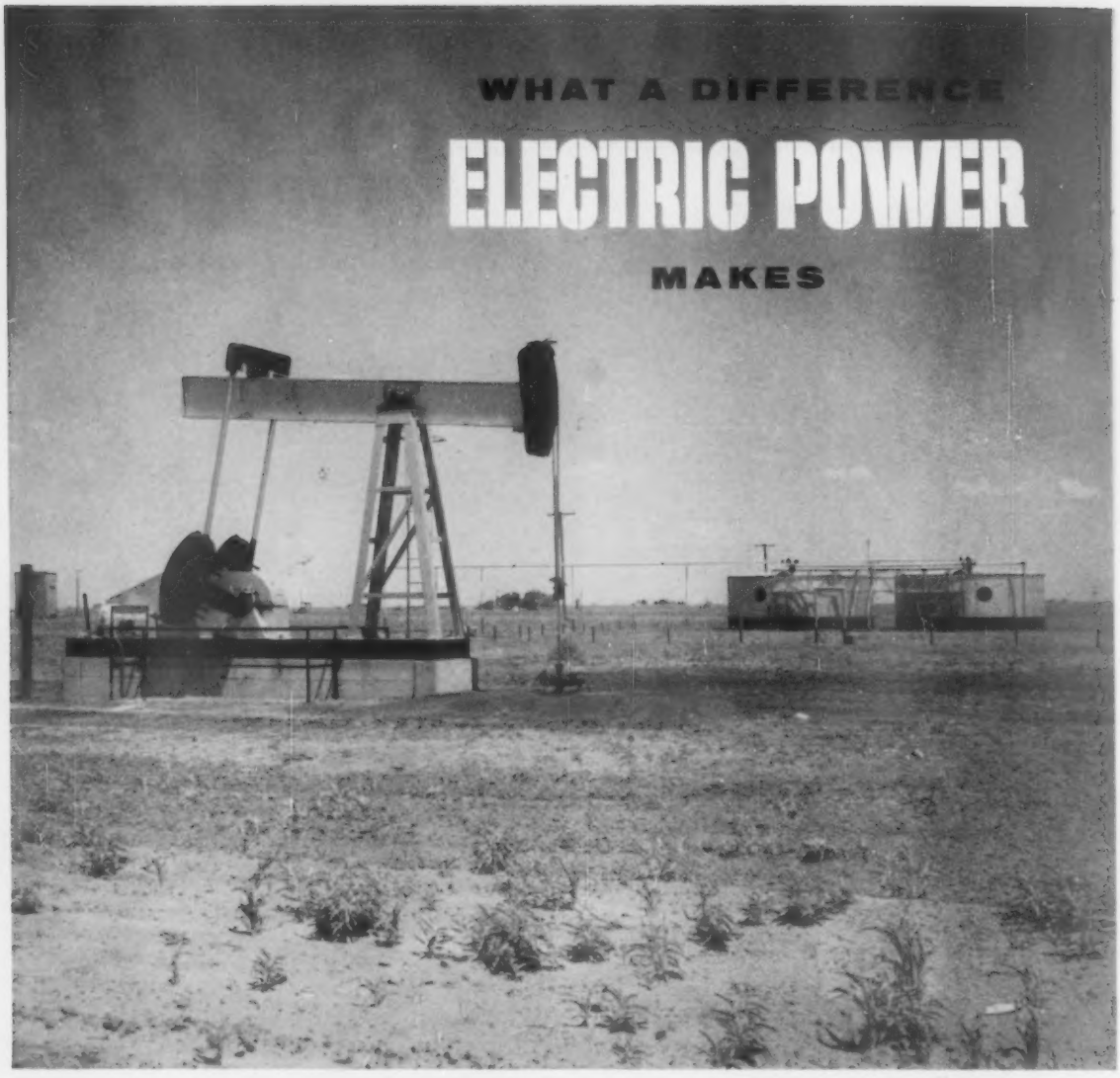

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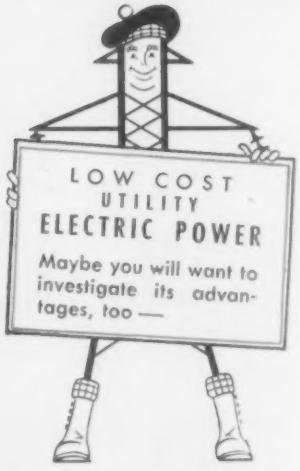

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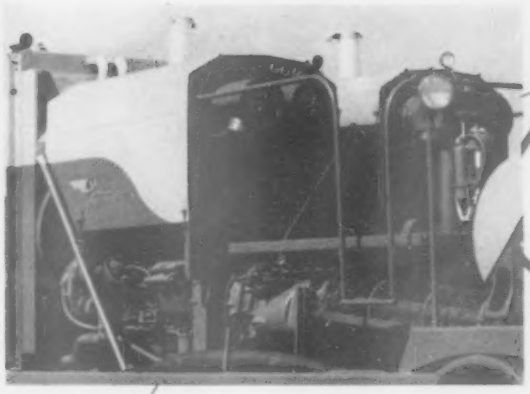

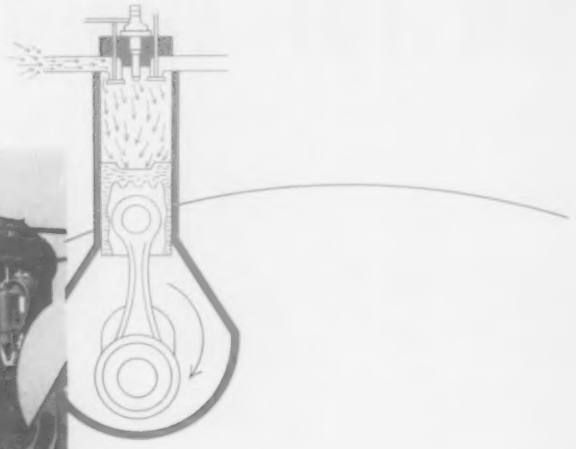

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- Lower exhaust temperatures.

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... offer the industry's widest range of pressure and volume capabilities for big and small jobs, deep or shallow wells, with high or low pressure ... available through Halliburton's wide variety of fracturing equipment. New Twin T-10 Pumping Units develop up to *1000 hydraulic (in-the-well) horsepower.*

For safer, higher capacity, more dependable fracturing, call the local or district office or write the Halliburton Oil Well Cementing Company, Duncan, Oklahoma. Ask for "Elements of Hydraulic Fracturing".

HALLIBURTON

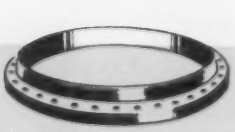
PIONEERS IN FRACTURING SERVICES

251 SERVICE CENTERS—JUST MINUTES AWAY FROM ANY RIG

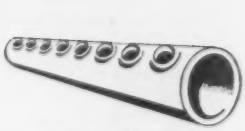
Build for the future .....

TAYLOR

Welding nozzles



T.E.M.A. flanges and channels

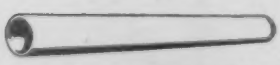


Multiple outlet headers

Production forgings

Venturi reducers

Spiral weld pipe



Large diameter electric weld pipe

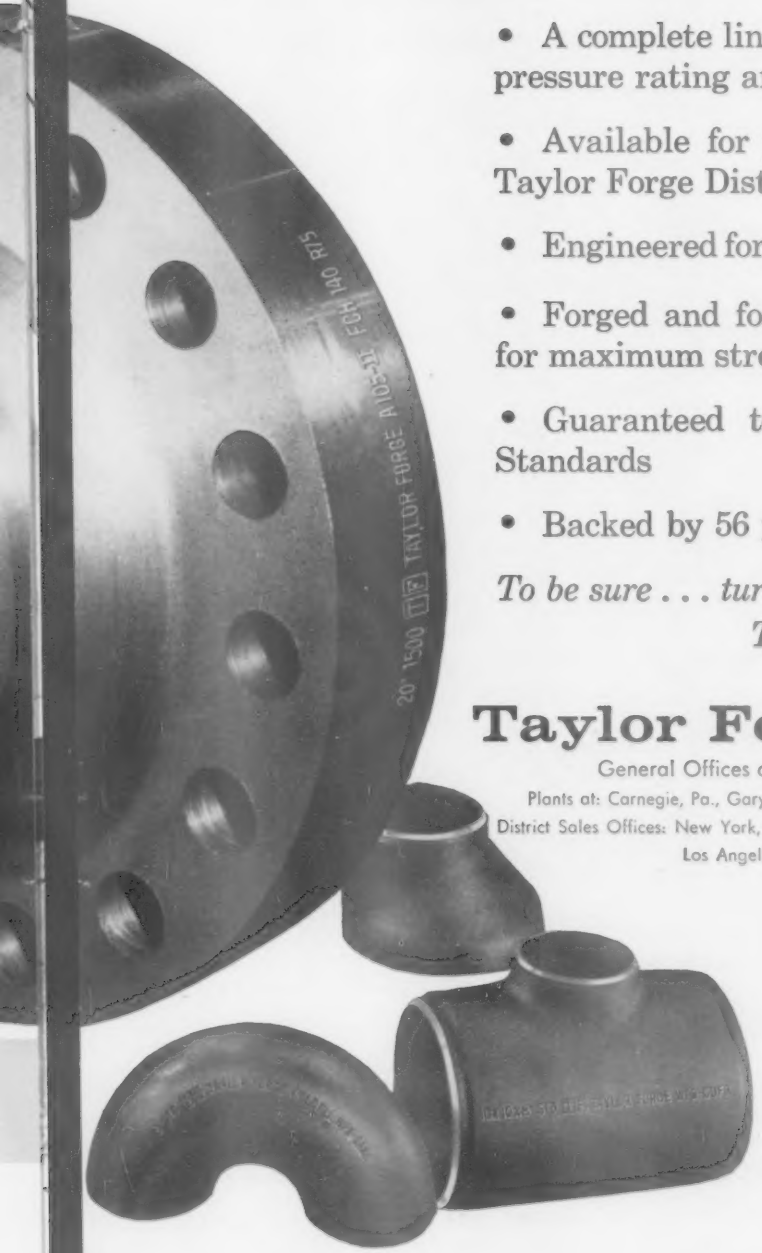
Welding necks

... today ..... with

T F

FORGE

Welding Fittings and Forged Flanges



- A complete line . . . in every type, size, thickness, pressure rating and material
- Available for prompt delivery from your nearby Taylor Forge Distributor
- Engineered for the utmost in accuracy and precision
- Forged and formed by the most modern methods for maximum strength and stamina
- Guaranteed to meet all American Codes and Standards
- Backed by 56 years of experience.

To be sure . . . turn to Taylor Forge . . .
TRADITIONALLY DEPENDABLE

Taylor Forge & Pipe Works

General Offices and Works: P. O. Box 485, Chicago 90, Illinois

Plants at: Carnegie, Pa., Gary, Ind., Houston, Texas, Fontana, Calif., Hamilton, Ont., Canada

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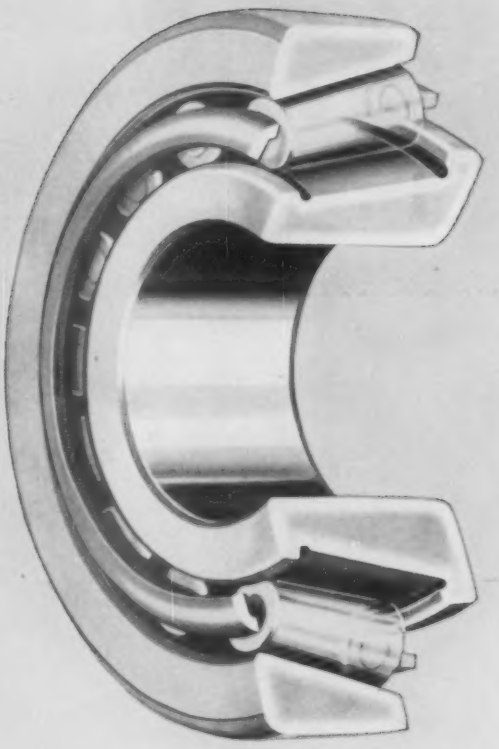
PROMPT SERVICE FROM YOUR NEARBY TAYLOR FORGE DISTRIBUTOR

He's as near as your telephone . . . and he carries a full stock of Taylor Forge Welding Fittings and Forged Flanges. You'll find his service efficient and reliable . . . and through him you also have available the services of Taylor Forge engineers for advice and counsel on any piping problems.

There's a BOWER TAPERED ROLLER BEARING engineered to fit your product



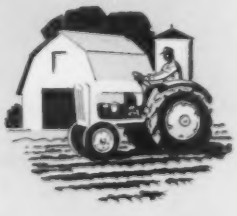
Types and sizes to fit a wide range of tapered bearing applications

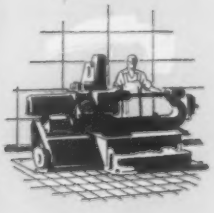
There's no need to compromise with bearings! Whatever your product, if it uses tapered roller bearings, call in a Bower engineer for expert help on selecting the exact type and size you need.

Depending on your own particular needs, he'll make sure you get the exact size and type—selected from Bower's complete tapered line—engineered to assure maximum performance in your application.

Most important of all, when you specify Bower tapered roller bearings for your product, you get all the advantages of advanced Spher-O-Honed design—less maintenance, longer life, smoother operation. Get the full facts on the *complete* Bower line.

Tapered, Straight and Journal Roller Bearings for every field of transportation and industry



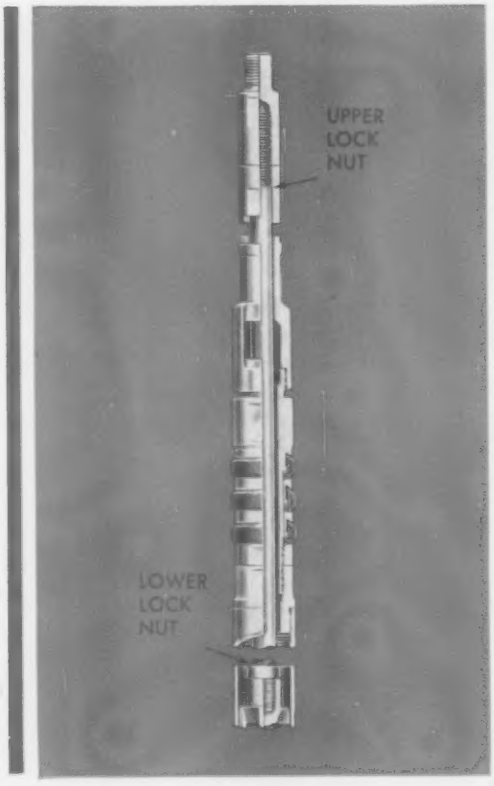


BOWER ROLLER BEARINGS

BOWER ROLLER BEARING DIVISION • *FEDERAL-MOGUL-BOWER BEARINGS, INC., DETROIT 14, MICH.*

VALVE ROD LOCK NUTS *Exclusive* ON D+B PUMPS

eliminate expensive fishing jobs...



UPPER LOCK NUT PREVENTS BREAKAGE OF VALVE ROD AND ELIMINATES UNSCREWING!

LOWER LOCK NUT ALSO PREVENTS VALVE ROD BREAKAGE AND ALLOWS A MEANS OF REMOVING PUMP WITH THE ROD STRING.

No matter what your subsurface pumping problem, you will find a D+B precision-built pump will meet your needs. Superior performance and proven design spell longer pump life and low maintenance. Prompt pump shop service is available when and where you need it from Continental-Emsco D+B Pump Shops and field men in all major producing areas.

CONTINENTAL-EMSCO

Serving the Oil and Gas Industries ... Worldwide

D+B
- DEEP WELL PUMPS
- SUCKER RODS
- COUPLINGS

CONTINENTAL-EMSCO COMPANY

A Division of The Youngstown Steel and Tube Company

General Offices: DALLAS, TEXAS • Plants: LOS ANGELES • HOUSTON • GARLAND, TEXAS

Representatives in All Principal Oil Fields of the World

P-702

HD-21 *(Illustrated)*

Hydraulic torque converter drive
204 net engine hp
Weight—78,250-lb tractor and side boom with full counterweight
127,000-lb lifting capacity at 4-ft overhang

HD-16

Hydraulic torque converter drive (optional)
150 net engine hp
Weight—57,840-lb tractor and side boom with full counterweight
77,580-lb lifting capacity at 4-ft overhang

It's easy to handle the pipe when it's easy to control the machine

CRADLING or lowering in pipe on steep hillsides or in mucky swamplands demands a crawler operator's full attention. That's why operators appreciate the many easy-operating features of an Allis-Chalmers crawler tractor and Tractomotive side boom. They provide precise maneuvering with a minimum of effort.

Finger-tip hydraulic booster steering

on the HD-16 and HD-21 requires only 3- to 5-lb pressure on the controls. Self-energizing brakes make brake-clutch coordination especially easy. They require less pedal pressure and take hold with a firm, uniform grip.

Easy-working side boom levers

Counterweights extend or retract smoothly in response to finger-tip pressure, enabling operator to maintain precise balance even on rough terrain. Side boom levers are within easy reach of operator and spaced to give ample hand room.

Matches speed automatically

The operator merely advances or retards throttle to synchronize tractor speed to that of cleaning-priming or doping-wrapping machines. There's no need to shift or slip the clutch with Allis-Chalmers hydraulic torque converter drive. Operator's hands are free for side boom work. Hydraulic torque converter drive, pioneered and proved in crawler tractors by Allis-Chalmers, is standard on the HD-21 and optional on the HD-16.

Greater operator comfort

Add to these advantages roomy, adjustable cushion seats, wide arm rests, electric starting, and it's easy to see why an operator does more with less effort when he's behind the controls of an Allis-Chalmers-Tractomotive combination. Let your dealer prove it with a demonstration.

TRACTOMOTIVE CORPORATION, DEERFIELD, ILLINOIS

TRACTOMOTIVE

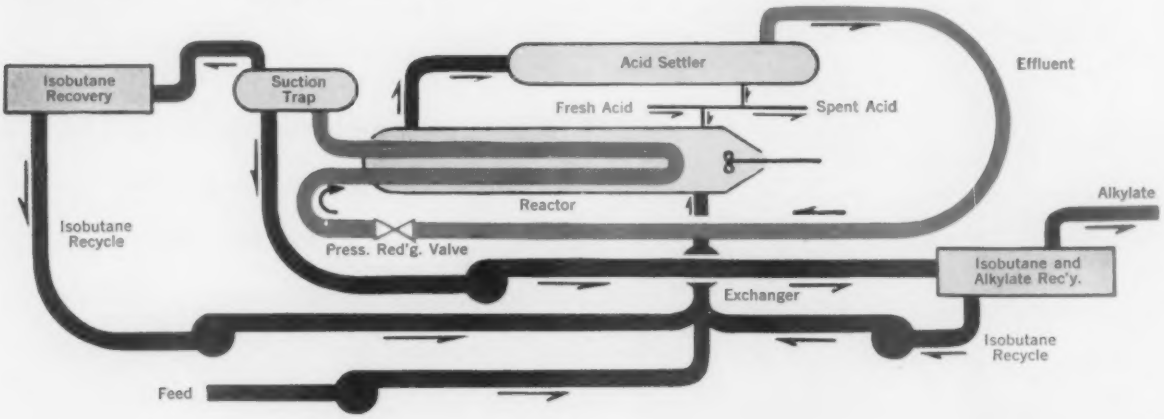
ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION
MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS

LOW-COST alkylate

FOR MOTOR OCTANE

effluent refrigeration



H_2SO_4 consumption—as low as 0.3 lb per gal of alkylate

EFFLUENT REFRIGERATION, the most important advance in alkylation technology in 15 years, now classifies alkylation as a most valuable process technique for production of the higher octanes. A substantially decreased acid consumption, higher yield of higher octane and a reduction in fractionation requirements for motor alkylate production are the major factors responsible for this most important process improvement.

An effluent refrigeration alkylation unit designed by Foster Wheeler is now being constructed for a major mid-western refiner. Capacity, 3,800 bbl per day of motor alkylate.

Flow description: Feed, mixed with recycle isobutane, enters reactor through heat exchanger. Thorough agitation with sulfuric acid, and high-isobutane ratio maintain optimum reaction conditions. Total reactor effluent separates in acid settler, acid returns to reactor. Hydrocarbon effluent from settler flows through pressure reduction valve into cooling coils in reactor maintaining predetermined temperature therein. Vapor and liquid separate in suction trap. Vapor, mainly isobutane, is recovered and returned to reactor. Liquid is pumped through heat exchanger to fractionation system where recycle isobutane and product alkylate are recovered. For further information write to *Foster Wheeler Corporation, 165 Broadway, New York 6, N. Y.*

FOSTER WHEELER

NEW YORK • LONDON • PARIS • ST. CATHARINES, ONT.

more power to you *for more oil field jobs*

All through the oil fields, you'll find abundant proof of the stamina that has made Continentals first choice for so many tough jobs. This Red Seal Model F-162 closed power unit, driving 4 x 6 Dean pump, furnishing water for a 6,500-foot drilling rig in Stonewall County, Texas, replaced another Red Seal which had been in service continuously for eight years. There are Red Seals engineered for every oil field application, at closely-spaced power levels, and available for use on all standard fuels. Ask your oil field supply store or get in touch with the nearest Continental Office.

• • •

GASOLINE AND LPG ENGINES

Model	Cyl.	Bore	Stroke	Displ.	Bare Engine H.P.
N56	4	2¼	3½	56	14.4 @ 2200 RPM
N62	4	2⅜	3½	62	15.3 @ 2200 RPM
Y69	4	2½	3½	69	21.4 @ 2400 RPM
Y91	4	2⅞	3½	91	28.5 @ 2400 RPM
Y112	4	3 1/16	3½	112	32.0 @ 2400 RPM
F124	4	3	4⅛	124	36.5 @ 2400 RPM
F140	4	3 1/16	4⅛	140	42.0 @ 2400 RPM
F162	4	3 1/16	4⅛	162	49.0 @ 2400 RPM
F186	6	3	4⅛	186	60.5 @ 2400 RPM
F209	6	3 1/16	4⅛	209	68.0 @ 2400 RPM
F226	6	3 3/16	4⅛	226	73.0 @ 2400 RPM
F244	6	3 7/16	4⅛	244	79.0 @ 2400 RPM
M271	6	3⅜	4⅛	271	86.2 @ 2400 RPM
M290	6	3¼	4⅛	290	92.2 @ 2400 RPM
M330	6	4	4⅛	330	104.4 @ 2400 RPM
M363	6	4	4 11/16	363	128.9 @ 2800 RPM
B371	6	4⅛	4⅝	371	110.0 @ 2400 RPM
B427	6	4 5/16	4⅞	427	127.0 @ 2400 RPM
G134	4	3⅛	4½	134	34.2 @ 2000 RPM
G157	4	3⅜	4½	157	40.0 @ 2000 RPM
E201	4	3⅝	4½	201	65.4 @ 2400 RPM
H227	4	3⅝	5½	227	54.0 @ 1800 RPM
H243	4	3¾	5½	243	57.9 @ 1800 RPM
H260	4	3⅞	5½	260	62.0 @ 1800 RPM
H277	4	4	5½	277	66.4 @ 1800 RPM
K363	6	4	4 11/16	363	123.0 @ 2400 RPM
J382	4	4½	6	382	74.0 @ 1400 RPM
T371	6	4⅛	4⅝	371	119.0 @ 2400 RPM
T427	6	4 5/16	4⅞	427	140.0 @ 2400 RPM
U501	6	4½	5¼	501	159.0 @ 2400 RPM
R513	6	4½	5½	513	164.3 @ 2400 RPM
R572	6	4¾	5½	572	182.4 @ 2400 RPM
R602	6	4⅞	5½	602	191.7 @ 2400 RPM
V603	8	4¼	4¼	603	220.0 @ 2800 RPM
S749	6	5⅛	5½	749	217.0 @ 2200 RPM
S820	6	5⅜	5½	820	237.0 @ 2200 RPM

CUSHIONED POWER DIESEL ENGINES

Model	Cyl.	Bore	Stroke	Displ.	Bare Engine H.P.
ZD129	4	3¼	3⅞	129	34.0 @ 2000 RPM
GD157	4	3⅜	4½	157	39.0 @ 2000 RPM
*ED201	4	3⅝	4⅞	201	45.8 @ 2000 RPM
HD243	4	3¾	5½	243	55.0 @ 2000 RPM
*HD260	4	3⅞	5½	260	59.0 @ 2000 RPM
*HD277	4	4	5½	277	63.2 @ 2200 RPM
*JD382	4	4½	6	382	72.5 @ 1600 RPM
TD427	6	4 5/16	4⅞	427	106.0 @ 2000 RPM
RD572	6	4¼	5½	572	154.0 @ 2000 RPM
VD603	8	4¼	4¼	603	175.0 @ 2600 RPM
SD802	6	5 5/16	5½	802	202.0 @ 1800 RPM

*Available for industrial applications only.

SERVICE FACILITIES AND GENUINE RED SEAL PARTS AVAILABLE EVERYWHERE

CONTINENTAL MOTORS ® Powerful as the Nation AMERICA'S STANDARD

Continental Motors Corporation

MUSKEGON, MICHIGAN

6 EAST 45TH STREET, NEW YORK 17, NEW YORK • 6218 CEDAR SPRINGS ROAD, DALLAS 9, TEXAS • 3817 SOUTH SANTA FE AVENUE, LOS ANGELES 58, CALIFORNIA • 1252 OAKLEIGH DRIVE, EAST POINT (ATLANTA) GEORGIA

GOOD EQUIPMENT IS BETTER WITH CONTINENTAL RED SEAL POWER

X2 Rods Pass 1½ Year Mark In Well in Southern California

Already past the first eighteen months of service, and still going strong—that's the performance Bethlehem X2 Sucker Rods are giving in the Pacific Oil & Gas Development Corporation's RFD-88-5 Well, in Southern California. The well is 3892 ft deep and is equipped with a Bethlehem 40D-T9S pumping unit. It is producing about 40 bpd gross of 17 gravity oil from a sand formation.

Whenever your operations call for medium pumping service in either non-corrosive wells or in wells which are properly inhibited, you can count on good performance with the Bethlehem X2 sucker rod. This is because the X2 is forged from a good grade of carbon-manganese steel, and is carefully normalized to provide uniform mechanical properties.

In addition to the X2 rod, Bethlehem produces other types of carbon and alloy rods, as well as a full line of accessories, enabling you to meet a wide variety of pumping conditions and corrosive problems. If you have any question about the use of Bethlehem rods and accessories, get in touch with your Bethlehem sucker rod distributor. He's at your service.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Distributor:
Bethlehem Steel Export Corporation

BETHLEHEM STEEL

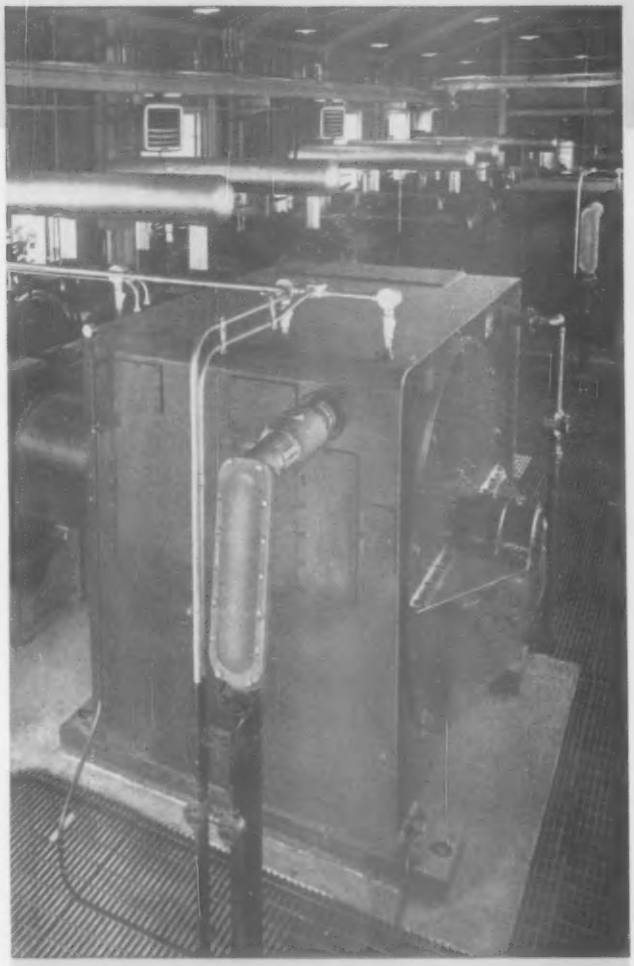
BETHLEHEM STEEL

ELLIOTT inert-gas-cooled motors solve refinery safety problem

Shown here are three Elliott 1000-hp, inert-gas-cooled motors driving reciprocating compressors which serve a catalytic reforming unit having a rating of 10,000 barrels per stream day.

Normally, motors for use within battery limits of light hydrocarbon processing units are of explosion-proof type. Because of the large size required, these inert-gas-filled (water cooled) totally-enclosed motors were chosen as safest and most economical for the application. Their satisfactory operation is evidence of the correctness of this choice.

The broad experience of Elliott engineers is available to help you select electrical equipment for either new or modernized installations. Inquire of our nearest District Office, or write Elliott Company, Ridgway Division, Ridgway, Pa.



Compressor room, showing three 1000-hp, 394-rpm, 2300-volt Elliott motors. They are of the "totally-enclosed, water-cooled" type, with inert gas instead of ambient air circulating over a tubular heat exchanger. The inert gas is introduced at a slight pressure of 0.15 psig. to maintain a positive pressure on the motor at all times.

R6-23

ELLIOTT Company

STEAM TURBINES • MOTORS • GENERATORS
DEAERATING HEATERS • EJECTORS • CONDENSERS
CENTRIFUGAL COMPRESSORS • TURBOCHARGERS
TUBE CLEANERS • STRAINERS

Add the experience and skill of Pittsburgh's

415 Finishes Technologists

to your finishing staff... without increasing your payroll!

Most modern paint research laboratory is now at your service to give you finishes with better resistance to corrosion and weather-wear.

● **Synthesis** of a new compound is one of the first steps in developing a new type of surface coating.

● **New resins** used in formulations for coatings are made in a pilot plant to provide quantities for field evaluation.

NOW YOU CAN GET specially-made finishes for oil and gasoline storage tanks to meet unusual conditions. Pittsburgh places at your disposal the most modern laboratories in the paint industry to help you develop tailor-made coatings that give greater protection against the destructive effects of corrosion and weather.

● **In its modern** Paint Research Center at Springdale, Pa., Pittsburgh maintains a staff of 415 highly trained chemists, engineers and technicians. From this group have come many important new finishes for the petroleum industry.

● **Outstanding among** these advancements is Pittsburgh's brilliant synthetic White TANKHIDE Double Cover. Intensely white controlled-chalking titanium pigments are combined with weather-resistant vehicles. One spraycoat of TANKHIDE Double Cover produces the same film thickness as two coats of conventional synthetic finish. This saves up to 25 % in labor and time, as reported by painting contractors.

● **Why not bring your new** or unusual finishing problems to us? We'll gladly place our facilities and manpower at your disposal. You'll be adding to your finishing staff, without increasing your payroll. Write, wire or call Pittsburgh Plate Glass Company, 1 Industrial Finishes Division, 1 Gateway Center, Pittsburgh, Pa.

PITTSBURGH PAINTS

PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS • FIBER GLASS

PITTSBURGH PLATE GLASS COMPANY

IN CANADA: CANADIAN PITTSBURGH INDUSTRIES LIMITED

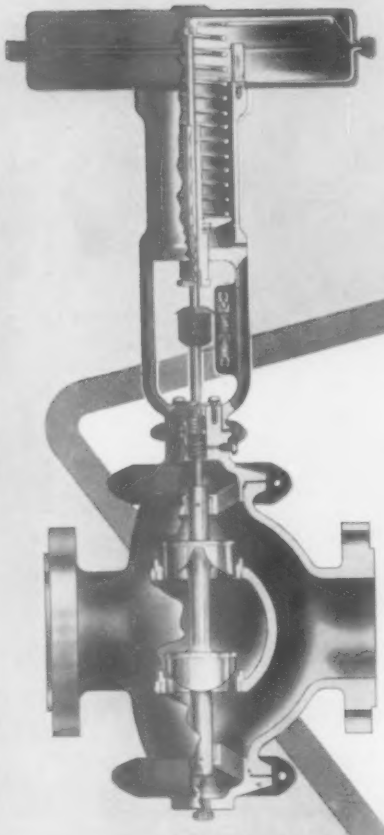
● **In this equipment** accelerated weather conditions are created to test finishes.

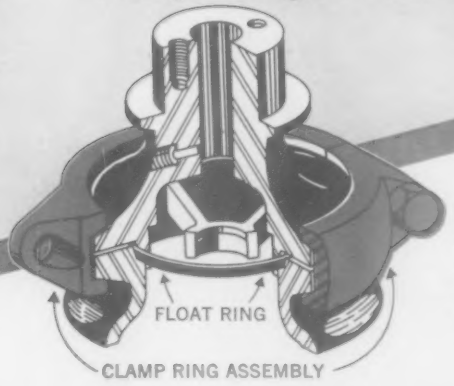
● **Special Pittsburgh finishes** of many types have been used successfully on structures and equipment by leading oil and gas companies.

New Clamp Ring···Float Ring Seal*

On BS&B's *Super* 70 series

Diaphragm Control Valves





. . . Makes Other Valve Closures Obsolete!

* Patented

The BS&B Super "70" Series Diaphragm Control Valves offer a thoroughly proven concept of pressure sealing, known as the clamp ring — float ring seal, for top and bottom closures.

Tightening of the heavy forged steel clamp ring seals the nickel plated, soft steel float ring into a precision machined, wedge-shaped groove formed by the valve body and the closure plate. Float rings are available in other materials compatible with alloy or stainless steel valve bodies.

Under pressure, the float ring is wedged tighter into its annular groove — thus increasing the sealing force. The higher the internal pressure, the tighter the seal!

This actuation under pressure also creates automatic compensation for thermal expansion under fluctuating temperatures. The seal is maintained under vacuum because initial tightening of clamp ring provides sufficient sealing force to hold a vacuum differential of up to 15 psi. Valves may be disassembled as often as required without damage to the clamp ring — float ring seal.

While a new BS&B exclusive feature in the diaphragm valve field, the float ring seal concept has also been most successfully used over the past several years by other leading manufacturers of high pressure equipment.

Why Clamp Rings Are Used On Super "70" Series Valves

The equivalent bolting area of the clamp rings used on Super "70" Series Valves is greater than that of a similarly rated ASA flange — yet is lighter in weight and more trim in appearance. Clamp rings make the valve easier to disassemble for servicing and cleaning because only two bolts must be removed, and permit the valve yoke to be oriented to any convenient position.

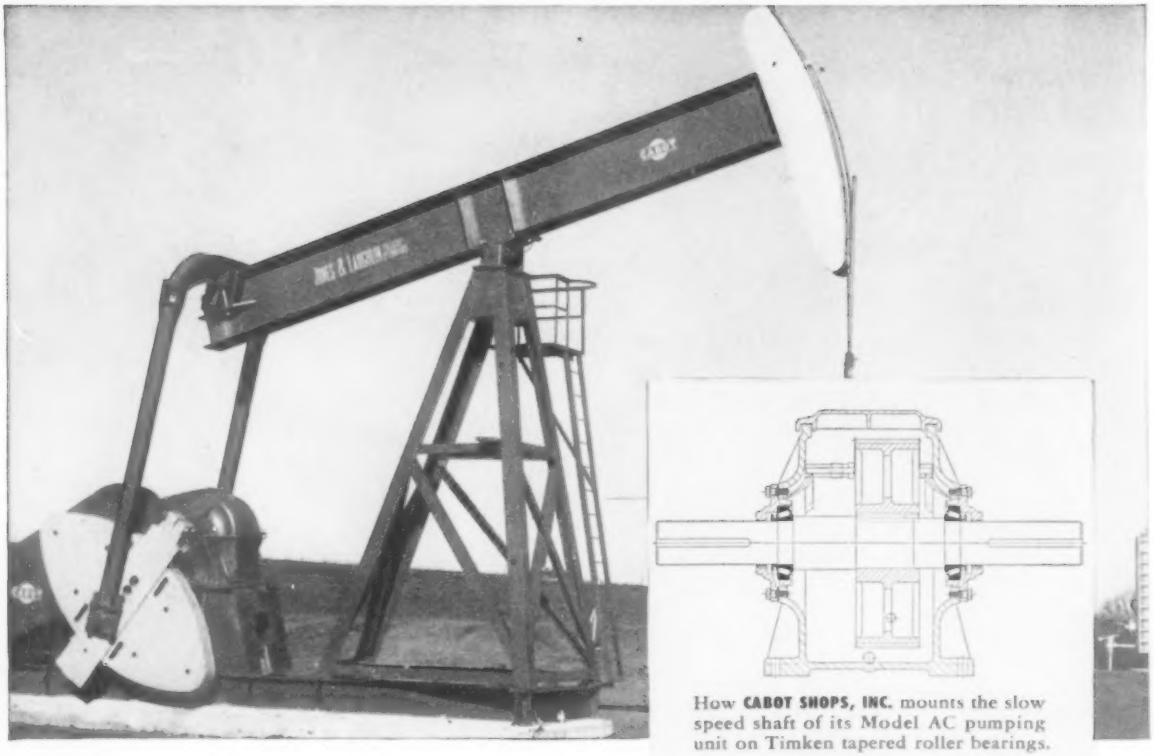
For more information on the all-new BS&B Super "70" Series Diaphragm Control Valves, ask your BS&B Sales Engineer — or write for Catalog 70-11.

EFFICIENCY OVER 60 YEARS BS&B RELIABILITY
ANOTHER EXAMPLE OF PRODUCT LEADERSHIP

BLACK, SIVALLS & BRYSON, INC.

Controls Division, Dept. 4-A2

7500 East 12th Street Kansas City 26, Missouri



How **CABOT SHOPS, INC.** mounts the slow speed shaft of its Model AC pumping unit on Timken tapered roller bearings.

How TIMKEN® bearings hold shafts in alignment despite heavy loads— cut gear wear on Cabot pumping unit

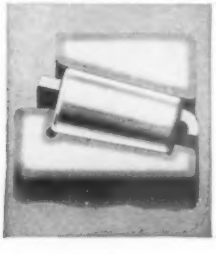
THE bearings on the slow speed shaft on this Cabot Shops, Inc. Model AC pumping unit face real problems. Since herringbone gears are used, the bearings must position all shafts. And since they're on the slow speed shaft, they must take heavy radial loads. To add to the problem, this equipment must run for years with very little attention. So the bearings must be practically maintenance-free.

To solve these problems, Cabot engineers specified Timken® tapered roller bearings in each gear box. Timken bearings are designed to do such tough jobs easily. Full line contact between rollers and races gives them greater load-carrying capacity. And tapered design lets Timken bearings take *both* radial and thrust loads or any combination. As a result, end play is minimized. Shafts are held in proper alignment. Gear wear is reduced. Because Timken bearings hold housings and shafts concentric, closures are more effective. Lubricant stays in—dirt and moisture stay out. Lubrication costs are kept way down.

One reason Timken bearings can take it month in and month out is that we make our own bearing steel. We're America's only bearing manufacturer that does. And we make the steel nickel-rich for added toughness.

To make sure you get all these advantages, specify Timken bearings on all the oil field equipment you build or buy. Look for the trade-mark "Timken" stamped on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



GREATER LOAD AREA

Because the load is carried on the *line* of contact between rollers and races, Timken bearings carry greater loads, hold shafts in line, wear longer.

Only Timken tapered roller bearings have these advantages: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. nickel-rich Timken alloy steels.

TIMKEN

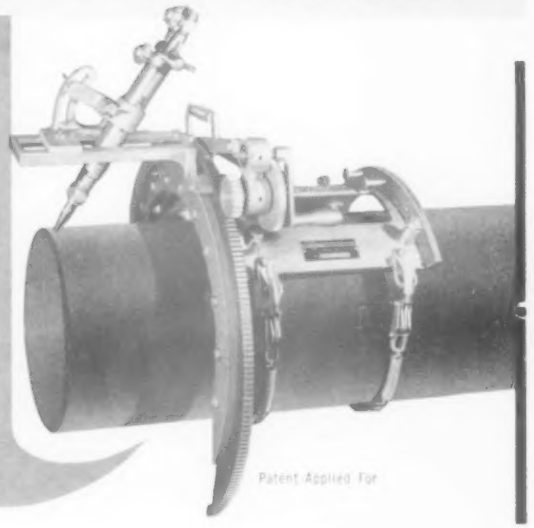
TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ∥ AND THRUST ⟷ LOADS OR ANY COMBINATION ✳

H&M the only line

OF PIPE CUTTING AND BEVELING MACHINES OFFERING
A *COMPLETE RANGE* of 1½" to 36" in *DIAMETER*

EASY TO OPERATE
LIGHTWEIGHT
PROFITABLE
ACCURATE
EFFICIENT
PORTABLE
DURABLE
RUGGED
SPEEDY



Again, H&M paces the field by providing the only complete line of lightweight, portable pipe cutting equipment based on the famous H&M horseshoe split gear principle, with models for 1½" to 4" — 4" to 8" — 8" to 12" — 14" to 20" — 22" to 26" — 26" to 30" — 28" to 36"! Write today for fully illustrated details on the full H&M line.

H&M PIPE BEVELING MACHINE CO.

Trademark Registered

TULSA, OKLAHOMA

311 E. Third St. Diamond 3-0241

The answer may be in the bag

(Dow tech service serves as a short cut in dehydration problems)

"Time is money," the saying goes. And where time is to be saved in solving gas dehydration problems, you're likely to find a Dow tech service man armed with facts.

His experience on the use of glycols—and ethanolamines—often shows the short route to the answer. Yet his is a divided responsibility that works for your good. When our technicians are not in the field giving on-the-spot help, they're back in our lab analyzing samples with up-to-date equipment.

Unaccountable losses may be causing you to ask yourself, "Is my process as efficient as possible? Am I getting the most for my glycol dollar?"

Certainly, you have the know-how to find the answers yourself. But with Dow tech service on your side, trial and error are minimized. You often find the solution as near as one of our representative's carrying case. THE DOW CHEMICAL COMPANY, Midland, Michigan, Dept. GDS13K.

YOU CAN DEPEND ON DOW

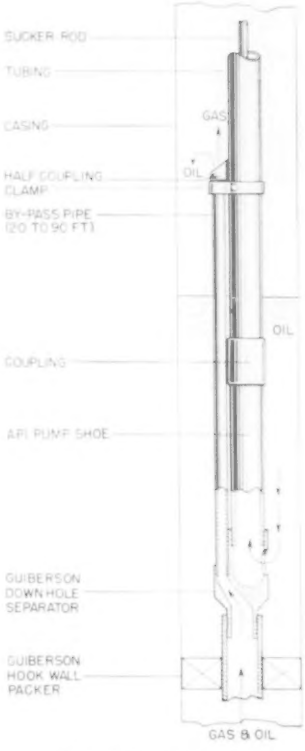
Answer To An Old Problem!

Down Hole Separator

DOWN HOLE SEPARATOR

for pumping wells

The Guiberson down hole separator increases production and eliminates the problem of gas locks, etc., in pumping wells where the produced fluid has a high gas/oil ratio. Less than a foot in length, the separator is screwed directly into a Guiberson packer and the pump shoe fitted directly onto the separator. One to four joints of by-pass pipe, depending upon the producing characteristics of the well, are screwed into the separator and clamped to the tubing. Attached to the top of the by-pass pipe is a half-coupling cut on a diagonal which guides the unit past casing joints. By-pass pipe hugs the tubing as snugly as couplings permit. Production crosses over from the tubing below the packer into the annulus above it and is carried well above the pump shoe by the by-pass pipe. The large annulus above the packer allows the gas to break out of solution and the oil drops back to the large reservoir above the packer where it is picked up by the pump, comparatively free of gas. The separated gas is bled off of the casing continuously. Intake ports on the separator have a larger by-pass area than the tubing. The separator is precision machined from cast steel.



Schematic Installation

ENGINEERING DATA

Part Number	Minimum Casing O.D.	Tubing Size And By-Pass	Maximum Metal O.D.	Approximate Weight	Approximate Length
29439	$4\frac{1}{2}$"	2" x $1\frac{1}{2}$"	$3\frac{3}{4}$"	12#	$13\frac{3}{4}$"
29133	5"	2" x $1\frac{1}{2}$"	$4\frac{1}{8}$"	14#	$10\frac{1}{2}$"
28369	$5\frac{1}{2}$"	2" x $\frac{3}{4}$"	$4\frac{1}{2}$"	15#	$10\frac{3}{8}$"
28645	$5\frac{1}{2}$"	2" x 1"	$4\frac{1}{2}$"	15#	$10\frac{3}{8}$"
29606	$5\frac{1}{2}$"	$2\frac{1}{2}$" x $\frac{3}{4}$"	$4\frac{1}{2}$"	15#	16"
28370	7"	$2\frac{1}{2}$" x 1"	$5\frac{7}{8}$"	20#	$11\frac{1}{8}$"

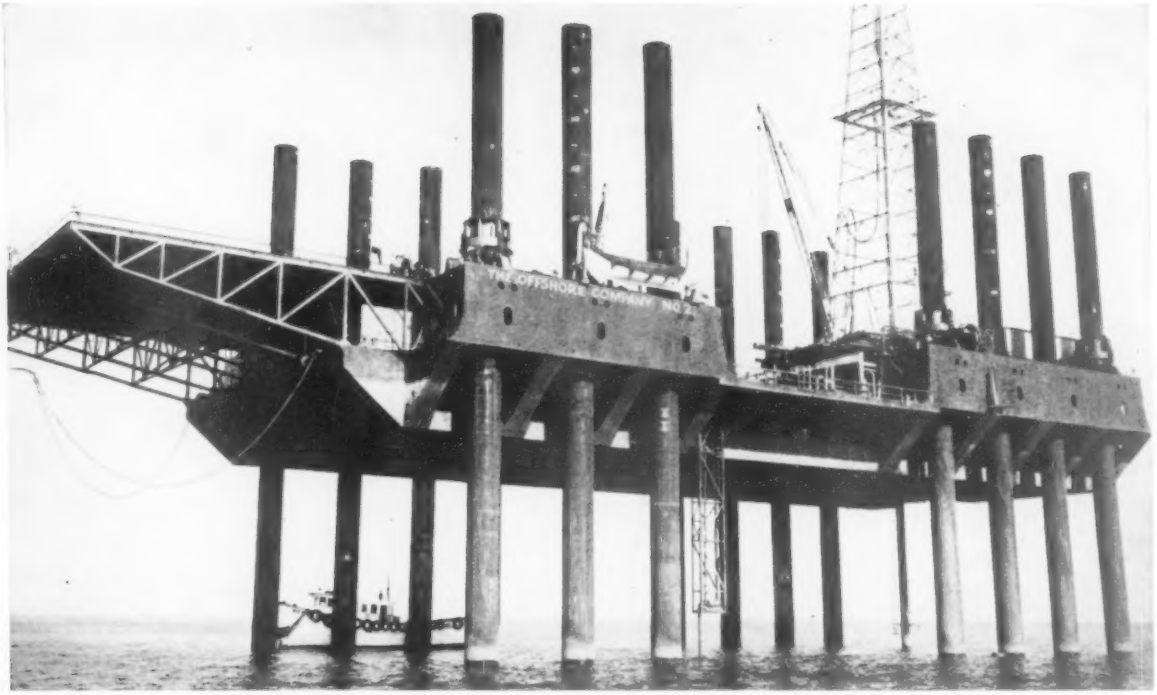
Note: The $4\frac{1}{2}$" x 2" and $5\frac{1}{2}$" x $2\frac{1}{2}$" sizes have NUE 10 round top and EUE 8 round bottom field connections; all other sizes are EUE 8 round both ends. When ordering specify part number, casing, tubing and by-pass size.

SAFE THAN SORRY GUIBERSON BETTER BE

THE GUIBERSON CORPORATION

ESTABLISHED 1919
DALLAS, TEXAS
U. S. A.

Sold by
Oil Field Supply Stores
Everywhere



OFFSHORE COMPANY'S MOBILE RIG 52 on location 45 miles southeast of Cameron, La. The Queen of the Offshore fleet is operating here in 58 feet of water, with a planned hole depth of about 9,000 feet.

EXCEPTIONAL COMMUNICATION NEEDS OF OFFSHORE COMPANY MET BY GENERAL ELECTRIC KNOWHOW

To obtain dependable two-way radio communication with its rigs and cars throughout the Louisiana Gulf Coast from headquarters in Baton Rouge, the Offshore Company needed more than a normal two-way radio system. General Electric engineers solved Offshore's communication problem of extra-long distances between mobile locations by designing the Offshore radio system around a centrally located base station remotely controlled from Baton Rouge, La.

Offshore's main transmitter, a 250-watt G-E unit, is located 40 miles south of Baton Rouge with its antenna atop a 450-foot tower. This base station, remotely controlled from Offshore's Baton Rouge headquarters by means of a 450-megacycle relay link, has the effect of doubling Offshore's radio coverage to the south.

SELECTIVE PAGING

Another unique feature of Offshore's General Electric radio system is electronic selective paging. This allows the Baton Rouge dispatcher to sound a buzzer on the desired offshore or inland rig when no one answers his call. The buzzer, which can be heard throughout the rig, greatly increases the speed with which radio messages get through to the person sought.

The equipment operated by Offshore includes 250-watt General Electric two-way radio stations on 15 rigs and 60-watt units in 13 company cars. The company reports excellent ranges and dependability from all its radio units...over land *and* over water.

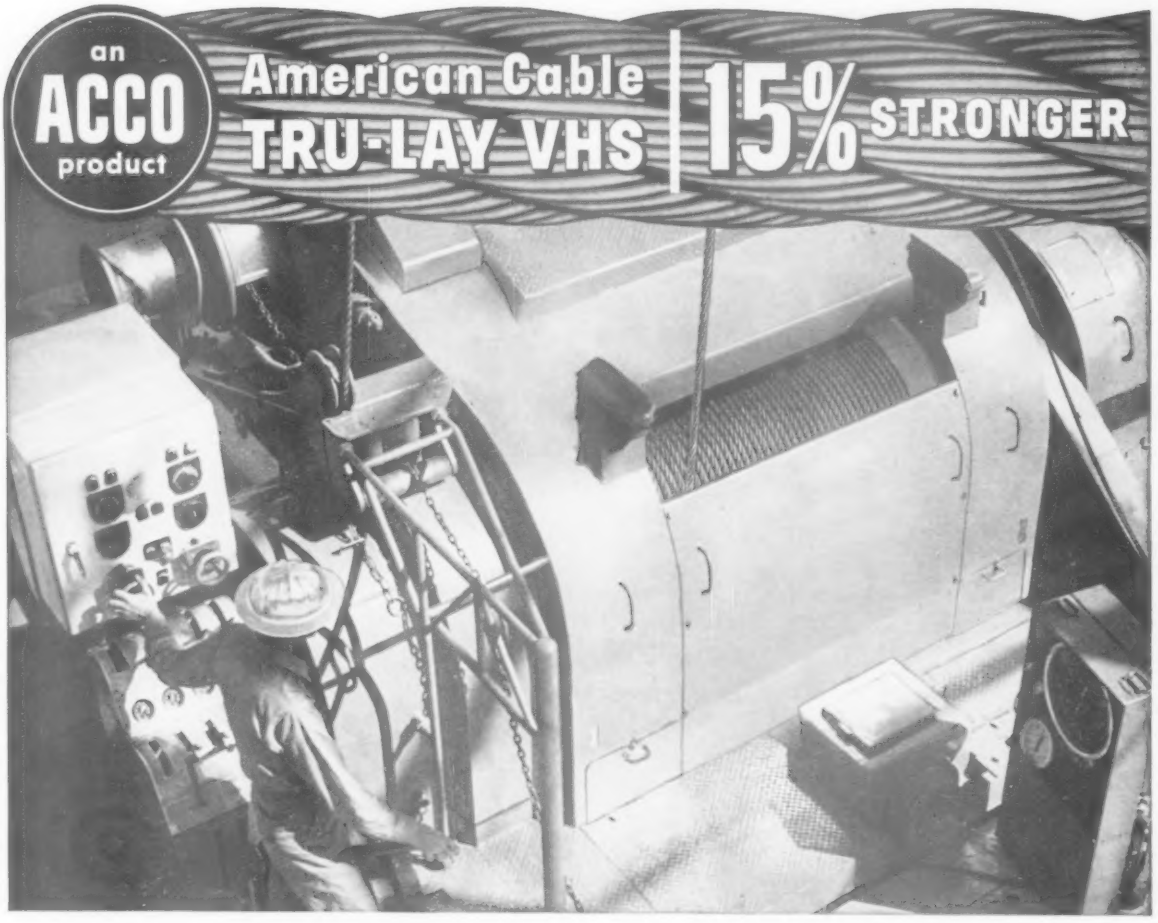
General Electric communication engineers can solve your communication problems with a well-planned radio system, utilizing the finest two-way radio made–the Progress Line. Such exclusive standard features as 6600-series communication-type tubes and controlled reluctance microphones, plug-in versatility, and low-cost maintenance based on a nationwide network of authorized service stations make the Progress Line your best assurance of dependable mobile communications.

Call in the General Electric communication experts; let them show you how well a Progress Line radio system will fit your specific needs.

FOR SALES AND SERVICE see "Radio Communication Equipment" in your Yellow Pages. Or, write: General Electric Company, Communication Products Department, C5127-4, Electronics Park, Syracuse, New York. *In Canada, write:* C.G.E. Electronics, 181 Lansdowne Avenue, Toronto.

Progress Is Our Most Important Product

GENERAL ELECTRIC



Drill Deeper and Faster with New VHS Rotary Drilling Lines

Drillers in every part of the oil country are proving to themselves the benefits of new VHS Rotary Drilling Lines. Made of a new grade of steel for wire rope, these new VHS lines are 15% stronger than Improved Plow Steel—the strongest available up to now. The new VHS is tougher, too. It gives you many important advantages, including:

Higher Factor of Safety

Careful calculations show that the factor of safety for 10 lines of TRU-LAY VHS rope is 14.9% or 15% higher than for 10 lines of IPS rope. To say it another way, the factor of safety for 12 lines IPS is almost identical to 10 lines of VHS rope. This alone would be reason enough to order VHS rope.

Faster Drilling—Less "Down Time"

With new VHS, you can drill deeper before increasing the number of parts of line. And VHS's extra strength eliminates, in many cases, any necessity for buying new blocks or regrooving sheaves to use larger diameter lines for higher safety factors.

Tougher

Because TRU-LAY VHS is stronger *and* tougher, it has greater resistance to abrasion and higher resistance to peening . . . both important factors in maintaining shape and diameter. Ton-mile advantages should result if regular adaptable cut-off practices are followed.

Simple Ordering Procedure

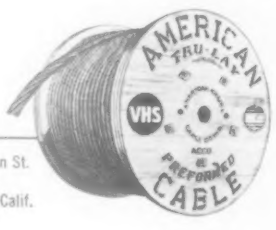
Nothing could be simpler than ordering VHS Rotary Drilling Lines. Just ask your nearest Mid-Continent Supply store for a new VHS drilling line in the length and diameter you need.

For further information write to the nearest American Chain & Cable Company office listed at right for
Brochure DH-516H

ACCO
TRADE MARK

American Cable Division
AMERICAN CHAIN & CABLE

630 McFarland St., Houston 1, Texas | 4555 E. 46th Ave., Denver 16, Colorado | 2216 S. Garfield Ave., Los Angeles 22, Calif. | 400 W. Madison St., Chicago 6, Ill.
Wilkes-Barre, Pa.; Odessa, Texas; New York, N.Y.; Philadelphia, Pa.; San Francisco, Calif.



Dependable All-Wheel traction

One of 9 reasons why oil men find International Trucks cost least to own!

Here are 4-wheel-drive and 6x6 trucks that need no roads. They make their own with all wheels *working*.

You get dependable sure-footed traction and extra pulling power to go through sand, mud and snow . . . up the steepest grades with a full load. No need to take the long way around. Ideal for highway hauling, too.

Every INTERNATIONAL All-Wheel-Drive model is completely factory-built for reliable performance and lasting economy . . . built to cost *least* to own.

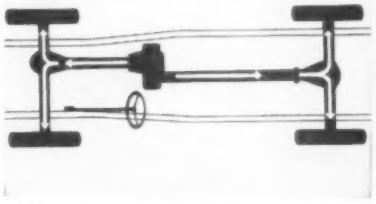
And fleet cost records prove* that INTERNATIONAL Trucks *do* cost least to own.

Why not start *saving* more, *earning* more money right now with the rough-and-ready truck that goes everywhere. Your INTERNATIONAL Dealer is the man to see.

**Signed statements in our files, from fleet owners throughout the U.S., back up this statement.*

INTERNATIONAL HARVESTER COMPANY, CHICAGO
Motor Trucks • Crawler Tractors
Construction Equipment • McCormick® Farm Equipment and Farmall® Tractors

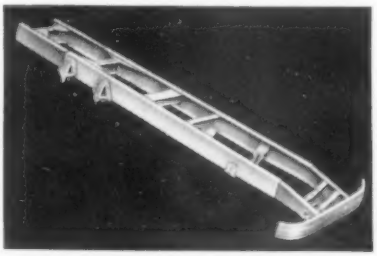
1 **All wheels are working** for you with this INTERNATIONAL 6x6. You get to places never before possible. Rough terrain and hills are easily negotiated. Save valuable time and money. 6x6 models with 22,000 to 43,000 lbs. GVW.



2 **Two-speed transfer case** transmits power from the transmission to front and rear axles or rear axle only. Quiet, cloverleaf design for straight-thru drive, extra dependability and lowest maintenance. Full torque power take-off available.

3 **Brakes with big lining areas** are the self-energizing type for low pedal pressure and sure stops. Sealed to keep out dirt and moisture for greater dependability and reduced service. Power brakes standard or available on all models.

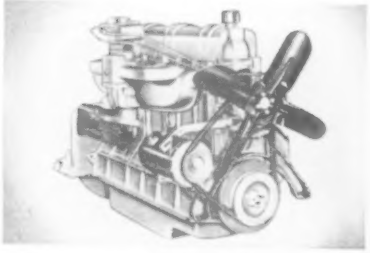
4 **Every cab is a full-sized beauty.** Plenty of leg and head room, 3-man-wide seats. Sturdily constructed with double back walls. Special cab mountings, rugged understructure and bracing to stand up under the most extreme conditions.



5 **INTERNATIONAL Steel-Flex frames** are constructed with cold squeezed rivets for added strength and durability. S-120 (4x4) models have kickup for extra low loading height. Larger models have full load-length reinforcements.

6 **Easy, positive steering** with over-size cam and roller-mounted twin lever gears. Controls mounted ahead of the front axle. You get greater stability, less shocks, comfortable steering angle . . . best handling on all types of terrain and roads.

This is the popular light-duty Model S-120 (4x4) INTERNATIONAL Truck. Features full-size, 3-man-wide cab and a choice of 12 different full-size, factory-built bodies, including the widest 6½ ft. pickup in the industry. Powered by 131 hp., short stroke, 6-cylinder engine, gasoline or LPG fuel. Available with factory-installed 8,000 or 15,000 lbs. capacity front-mounted winch, snowplow and other specialized equipment.



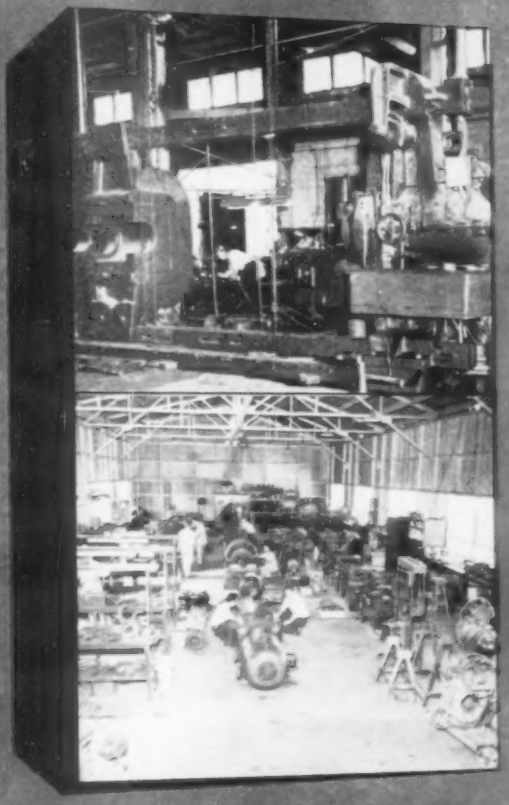
7 **Dependable, economical power** with sixteen 6-cylinder engines, up to 212 hp. Heat-treated, forged steel crankshafts and big bearing areas for a longer, more useful life. Precision machined, quiet, long lasting timing gears, too.

8 **Save time and money.** Get the truck that matches your job *exactly*. No need to compromise with the great span of 12 factory-built INTERNATIONAL 4x4 and 6x6 models, 7,000 to 43,000 lbs. GVW. Choice of job-matched components.

9 **World's most complete line.** There is an INTERNATIONAL "tailor-made" for every truck job, ½ tonners to 90,000 pounders. Choice of 4-wheel, 6-wheel and all-wheel-drive models, conventional and COE design. Every one built to cost *least* to own.

AVONDALE

a name you know for "Special Oil Services" . . .



OIL FIELD MACHINE SHOP

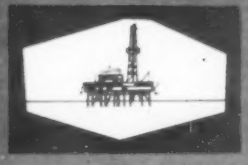
A part of Avondale's growing diversification to meet the special requirements of the oil industry is reflected in their recently enlarged OIL TOOLS DEPARTMENT with the addition of a new Oil Field Machine Shop. Here the top combination of expert mechanics and modern machines makes it possible to offer fast and efficient service on all types of repair to oil tool drilling equipment . . . 24 hours a day, 7 days a week.

ELECTRICAL DEPARTMENT

Another Avondale service kept right up-to-the-minute to meet your special needs, this department is ready to meet your most exacting requirements in the electrical field. Motor rewinding is a specialty, but facilities are available for all types of electrical jobs. You will be pleased by the prompt turn-out of your work when you deal with Avondale.

. . . and many other "special services"—engineering, research, design, fabrication, conversion and, of course, all types of construction of oil marine equipment.

SERVICE · INTEGRITY · EFFICIENCY



SHIP BUILDING · SHIP REPAIRING · FOUNDERS · PROPELLERS · STRUCTURAL STEEL

AVONDALE MARINE WAYS, INC.

CABLE ADDRESS "AVONWAYS"

P. O. BOX 1030 • PHONE UNiversity 6-4561 • NEW ORLEANS 8, U. S. A.

Full house at Great Bend!

We were pleasantly surprised, recently, at the Open House of one of our newest stores at Great Bend, Kansas. Not only did the size of the crowd surpass expectation, but we nearly ran out of coffee and doughnuts on several occasions. As one of our men described it:

"We had the place filled with customers and townspeople all day . . . not only from the Great Bend area but also from Russell, Chase, Pratt and the surrounding territory."

Events like this follow a tradition of friendly supply service that dates back to 1887 . . . the year of the first National Store at Cygnet, Ohio. Since that time, we've opened more than 350 stores to serve oilfields in the U.S., Canada and Venezuela. To constantly meet the fast-changing needs of the industry, we've closed those in territories where you no longer need service—we are often the first to open stores in new areas where you do need them. Because of your satisfaction with our policies and the thousands of products we stock, the current number of National stores is at an all-time high.

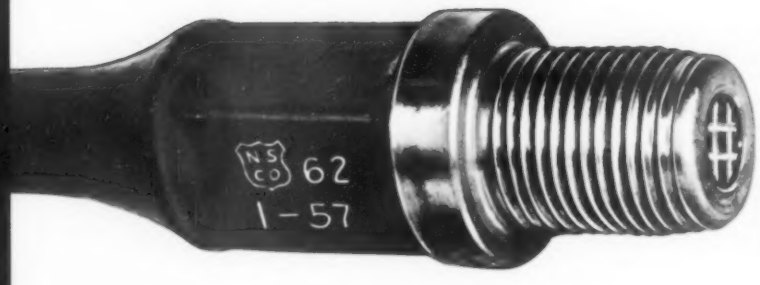
Wherever you're operating, and whatever your needs may be, you can count on National Supply for the best in oilfield equipment and supplies. At every store, you'll get fast service . . . and friendly, personal attention to all of your individual problems. Don't wait for a special open house invitation to enjoy these benefits!

THE
NATIONAL SUPPLY
COMPANY

NATIONAL GRADE 40

Yield Strength — 60,000-70,000 PSI

Recommended for use in handling moderate to heavy loads where little or no corrosion is encountered. While most well waters are corrosive to some extent, a great percentage give so little trouble they can be classed as a non-corrosive group. Grade 40 rods may be used in the presence of small quantities of hydrogen sulphide. These rods are normalized to give a fine, uniform grain structure.



NATIONAL GRADE 62

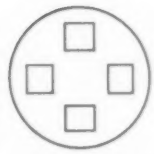
Yield Strength — 60,000 Min. PSI

This is the newest in the National line and is specially manufactured to handle moderate to heavy pumping loads in areas where medium corrosion and medium sulphide conditions occur. Grade 62 rods are of top grade steel, normalized and tempered to give adequate resistance to shock, fatigue and impulse loads.

NATIONAL GRADE 81

Yield Strength — 65,000-75,000 PSI

Recommended for moderate to heavy pumping loads where corrosion is bad, but sulphides not severe. Ideal for wells where corrosive salt waters are prevalent. Made from type 4600 nickel molybdenum steels to give greater yield and tensile strengths, this grade will resist corrosion fatigue action under heavy service loads.



NATIONAL GRADE 85

Yield Strength — 105,000 PSI

This rod is suitable for use in deep or heavily loaded wells for which high strength and corrosion resistance are required. As with all National alloy steel sucker rods, the Grade 85 is normalized and tempered full length.

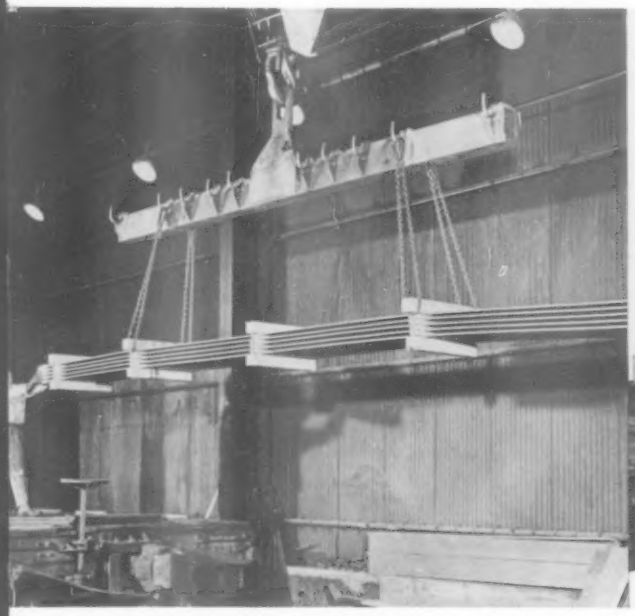
NATIONAL GRADE 92

Yield Strength — 90,000 PSI

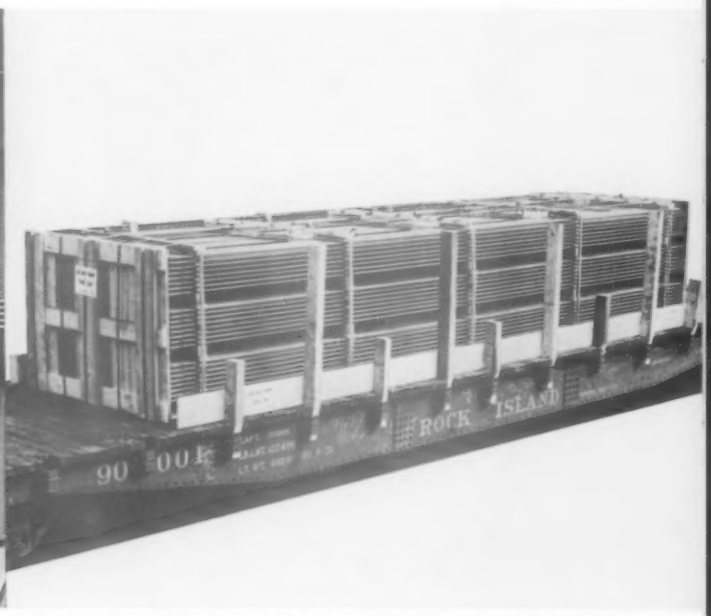
Developed to meet conditions encountered in deep wells. Grade 92 rods are made of the finest quality electric furnace steel. High mechanical strength assures long service under heavy beam loads. Addition of substantial quantities of nickel and chromium makes these rods ideal for use under severe corrosive and sulphide conditions. Truly, the Grade 92 is a dual purpose rod for the most difficult pumping conditions.

National Sucker Rods give you trouble free service at any depth!

. . . and they arrive at the well in factory condition!



Unit packaging, proved by hundreds of shipments to all parts of the world, facilitates handling of National Sucker Rods.



Special methods of loading for rail shipment prevent damage in movement and shipping. National's care in handling insures straight rods at the well site.

The National Hollow Rod

When wells with high paraffin content are being pumped, the National Hollow Sucker Rod permits the injection and circulation of chemicals, solvents or hot liquids without halting operations. This 1⅛" O. D. rod with ⅝" bore and ⅞" A.P.I. pin connections has also been successfully used in dual-zone pumping operation.

Ask the National representative in your area for more details soon.

THE
NATIONAL SUPPLY
COMPANY

MAIN OFFICE: Two Gateway Center, Pittsburgh 22, Penna.
DIVISION OFFICES: Denver; Ft. Worth; Houston; Toledo; Tulsa; Torrance
CANADA: The National Supply Company, Ltd., 200 F. W. Clark Building, 709 Eighth Avenue, West, Calgary, Alberta
EXPORT: 600 Fifth Avenue, New York 20, N.Y., U.S.A.; City Wall House, Chiswell Street, London E. C. 1

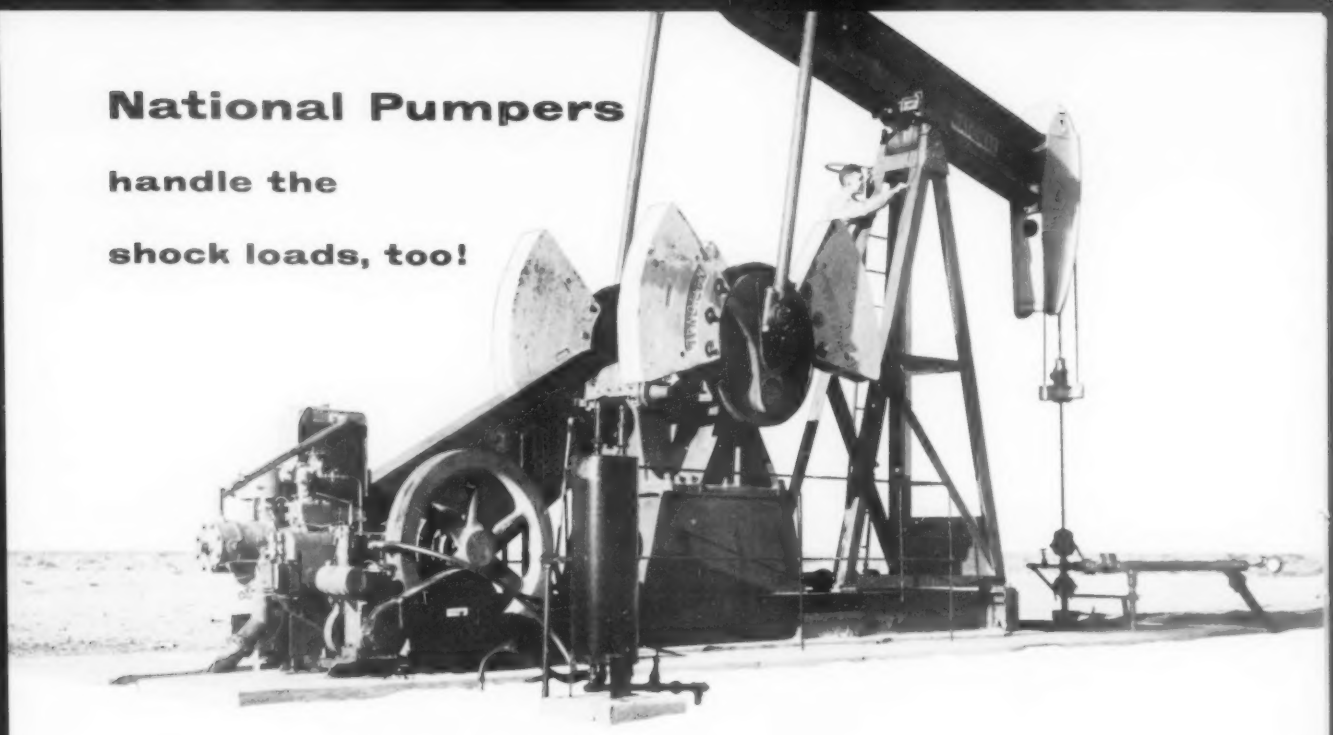
NATIONAL BLUE OIL FIELD MACHINERY AND EQUIPMENT
SPANG STEEL PIPE AND ELECTRICAL CONDUIT

More National production equipment on next page

National Pumpers

handle the

shock loads, too!



Load reversals can cause costly trouble if the pumping units aren't built to handle them. National Pumping Units have an extra margin of strength that meets this problem. They have exceptionally hard alloy steel gears and pinions designed for long wearing life. Gear train mounting and main bearings offer lower shaft loading and deflection . . . easily handle shock loads from load reversals.

There are other important National Pumping Unit features that insure dependable operation:

- Easy-to-install, strong main base.
- Exceptionally stable, well balanced samson post.
- Pitman assembly features easy maintenance, fast assembly.
- Rugged walking beam and beam hanger for extra years of service.

Get the facts on National Pumpers today. For the full story on the high performance and low operating costs they offer, see the National Supply Store men or representatives in your area soon. New bulletins describing these quality pumping units are available.

THE
NATIONAL SUPPLY
COMPANY

MAIN OFFICE: Two Gateway Center, Pittsburgh 22, Penna.
DIVISION OFFICES: Denver; Ft. Worth; Houston; Toledo; Tulsa; Torrance
CANADA: The National Supply Company, Ltd., 200 F. W. Clark Building, 709 Eighth Avenue, West, Calgary, Alberta
EXPORT: 600 Fifth Avenue, New York 20, N.Y., U.S.A.; City Wall House, Chiswell Street, London E. C. 1

NATIONAL BLUE OIL FIELD MACHINERY AND EQUIPMENT
SPANG STEEL PIPE AND ELECTRICAL CONDUIT

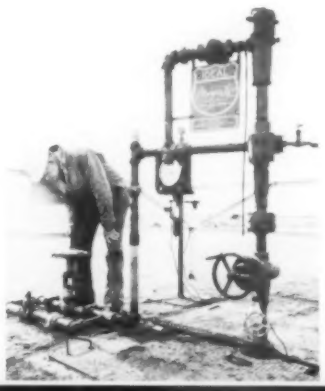
You get sound performance, too, from . . .

NATIONAL
Wellhead Equipment

Interchangeable units provide many combinations to meet your specific needs in size, capacity and type. Ease of assembly and pre-tested safety are two major features of this equipment.

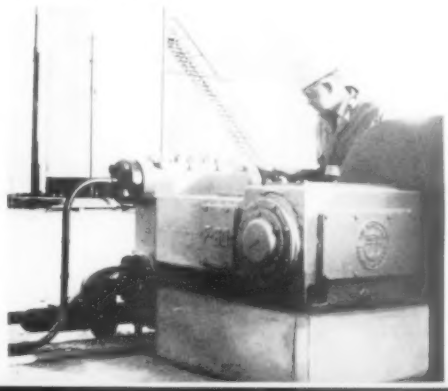
NATIONAL
Plunger Lift®

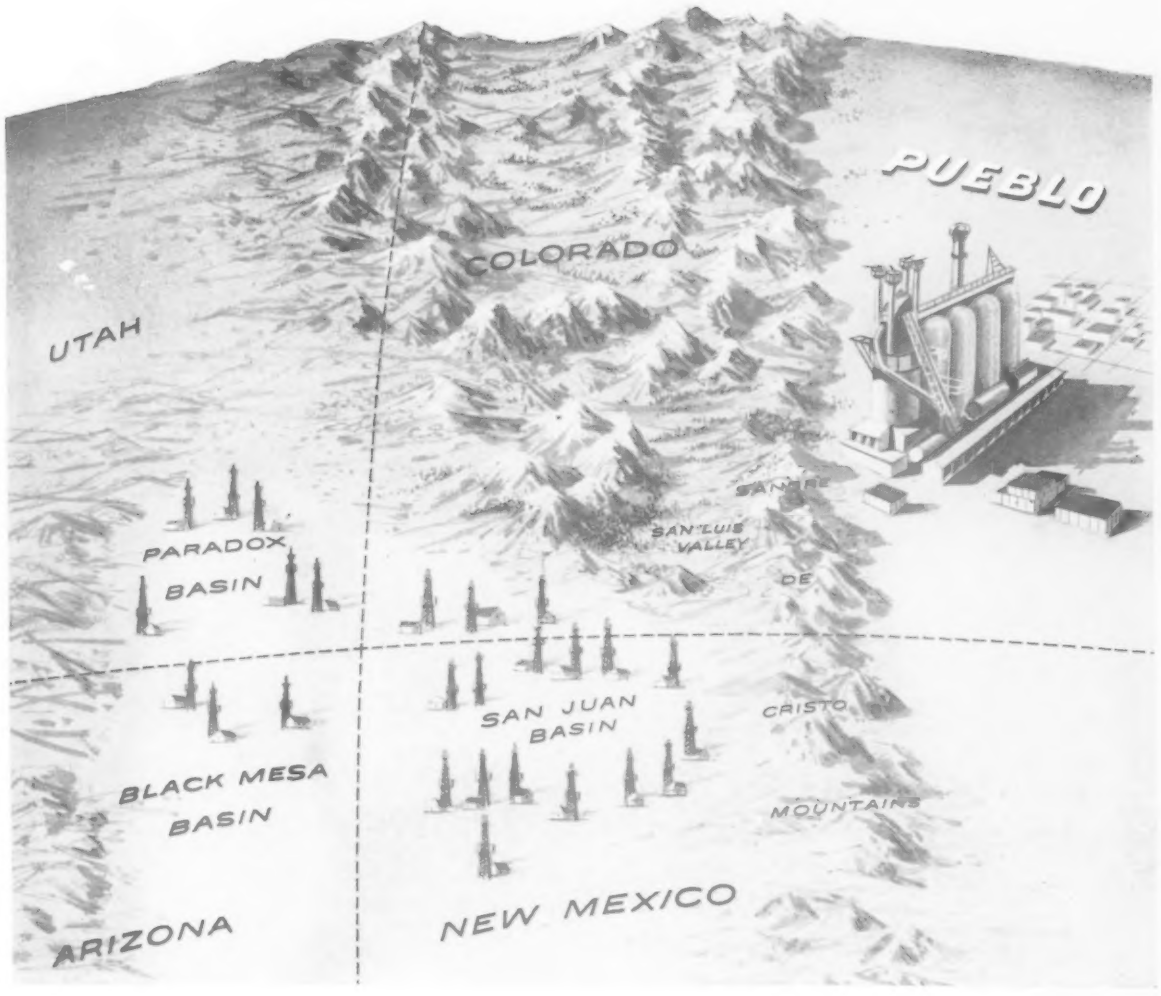
This unit uses formation pressure for economically producing wells where reservoir conditions are suitable. For these certain types of wells, it can be the best production method.



NATIONAL
Triplex Pumps

These pumps provide maximum volume and injection pressures for today's waterflood projects. Available in several hp ratings for both corrosive and non-corrosive service, they are especially suited as power-oil sources for subsurface hydraulic pumping, oil gathering and salt water disposal services.





you'll see

CF&I SEAMLESS CASING AND TUBING

throughout the four corners area

Take the San Juan Basin . . . or the Paradox Basin . . . or the Black Mesa Basin . . . or any other active part of the Four Corners Area. There you'll find CF&I Seamless Oil Country Casing and Tubing. For operators all over this important producing and exploration area have found that CF&I's conveniently located Seamless Tube Mill offers them top-quality casing and tubing.

CF&I Seamless Oil Country Casing and Tubing is available in 2⅜" through 9⅝" O.D. It meets or exceeds API STD 5A specification.

4433

SEAMLESS TUBULAR PRODUCTS
THE COLORADO FUEL AND IRON CORPORATION
Denver, Colorado

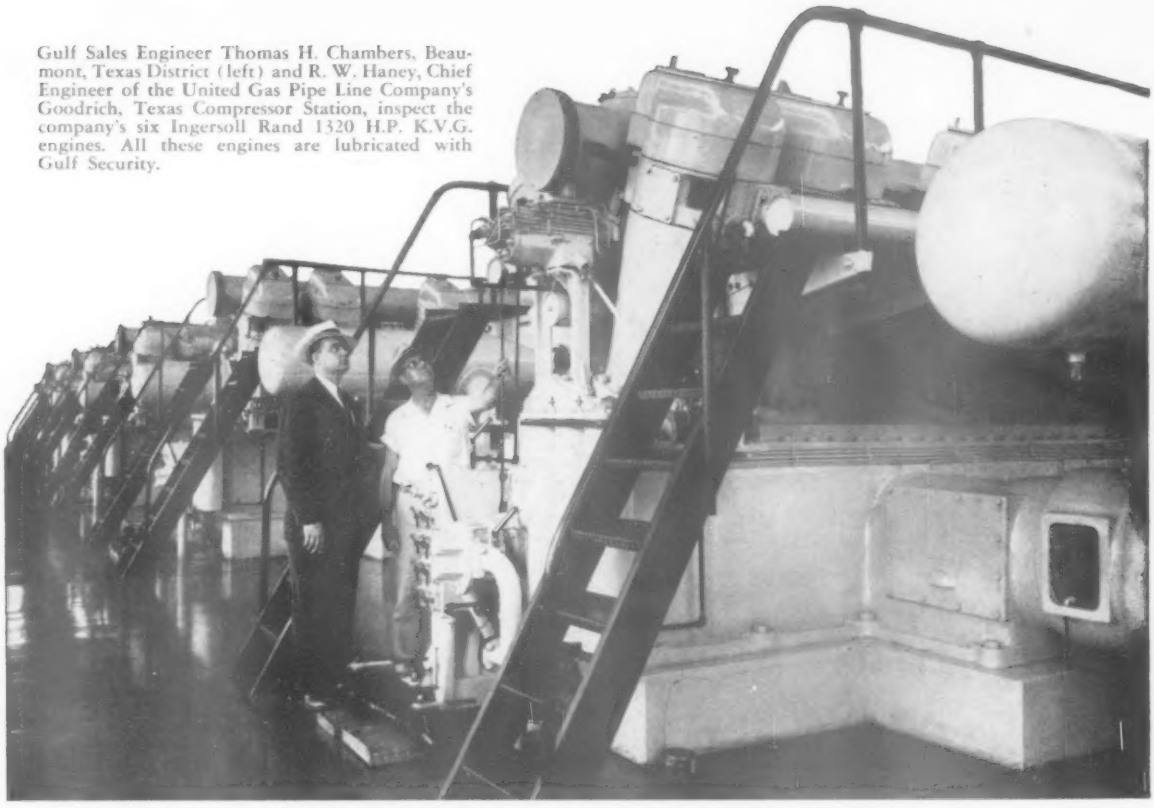
CF&I

Roebling
Royal Blue Wire Rope
will take **shock**
after **shock** after **shock!**

This, and the fact that Royal Blue is stronger than the strongest you have been using, has helped to make it the most widely favored rope in Roebling's history. It will work hard and last longer on *your* job. Your distributor or Roebling Sales Office will give you full information, or write: John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

ROEBLING

Distributors, Branches and Warehouses Throughout the Country
Subsidiary of The Colorado Fuel and Iron Corporation



Gulf Sales Engineer Thomas H. Chambers, Beaumont, Texas District (left) and R. W. Haney, Chief Engineer of the United Gas Pipe Line Company's Goodrich, Texas Compressor Station, inspect the company's six Ingersoll Rand 1320 H.P. K.V.G. engines. All these engines are lubricated with Gulf Security.

Lock out high maintenance costs in your gas transmission plants

with GULF SECURITY

Gulf Security's outstanding record in the lubrication of pipeline gas engine compressor units is your assurance of smooth, continuous operation. In scores of gas transmission plants this high quality straight mineral oil helps prevent operating troubles and contributes to low maintenance costs.

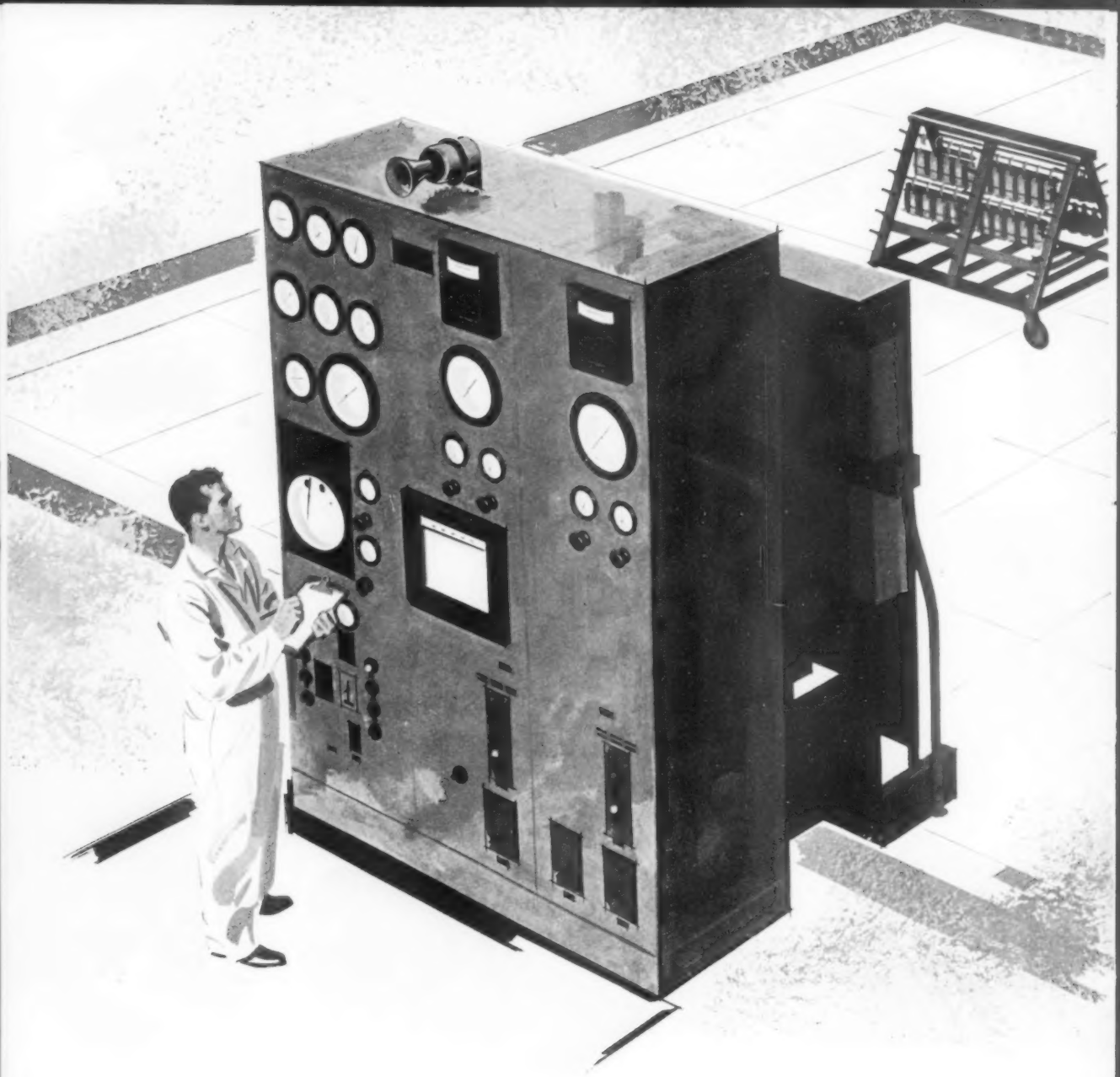
Gulf Security is a non-additive oil that does not cloud liquid filled lubricators of power cylinders, compressor cylinders, and packing glands. After years of operation with Gulf Security, cylinders and piston rings of both compressors and power assemblies show negligible wear, and its excellent oxidation stability helps prevent the formation of acid and resins in the crankcase system.

Make certain your units receive safe, effective lubrication protection—specify Gulf Security. And remember that Gulf provides the services of a trained, experienced petroleum expert—the Gulf Sales Engineer—to help you with any problem involving a petroleum product. Consult the telephone directory for the number of your nearest Gulf office.

GULF

Gulf Oil Corporation • Gulf Refining Company
1822 Gulf Building, Pittsburgh 30, Pa.

THE FINEST PETROLEUM PRODUCTS FOR ALL YOUR NEEDS



They set a new "drilling record" every day

When Schlumberger constructed its high pressure laboratory more than five years ago, drilling depths had barely exceeded 20,000 feet and bottom hole temperatures had seldom passed the 300 degree mark.

Yet the test wells in this Schlumberger laboratory were designed and constructed to reach 450 degrees maximum operating temperature and 25,000 psi working pressure, hydrostatically tested at 37,500 lbs.

As a result, Schlumberger had the cables, instruments and perforating guns perfected and ready to meet the challenge of extreme depths, pressures and temperatures when the present record well was drilled in Louisiana.

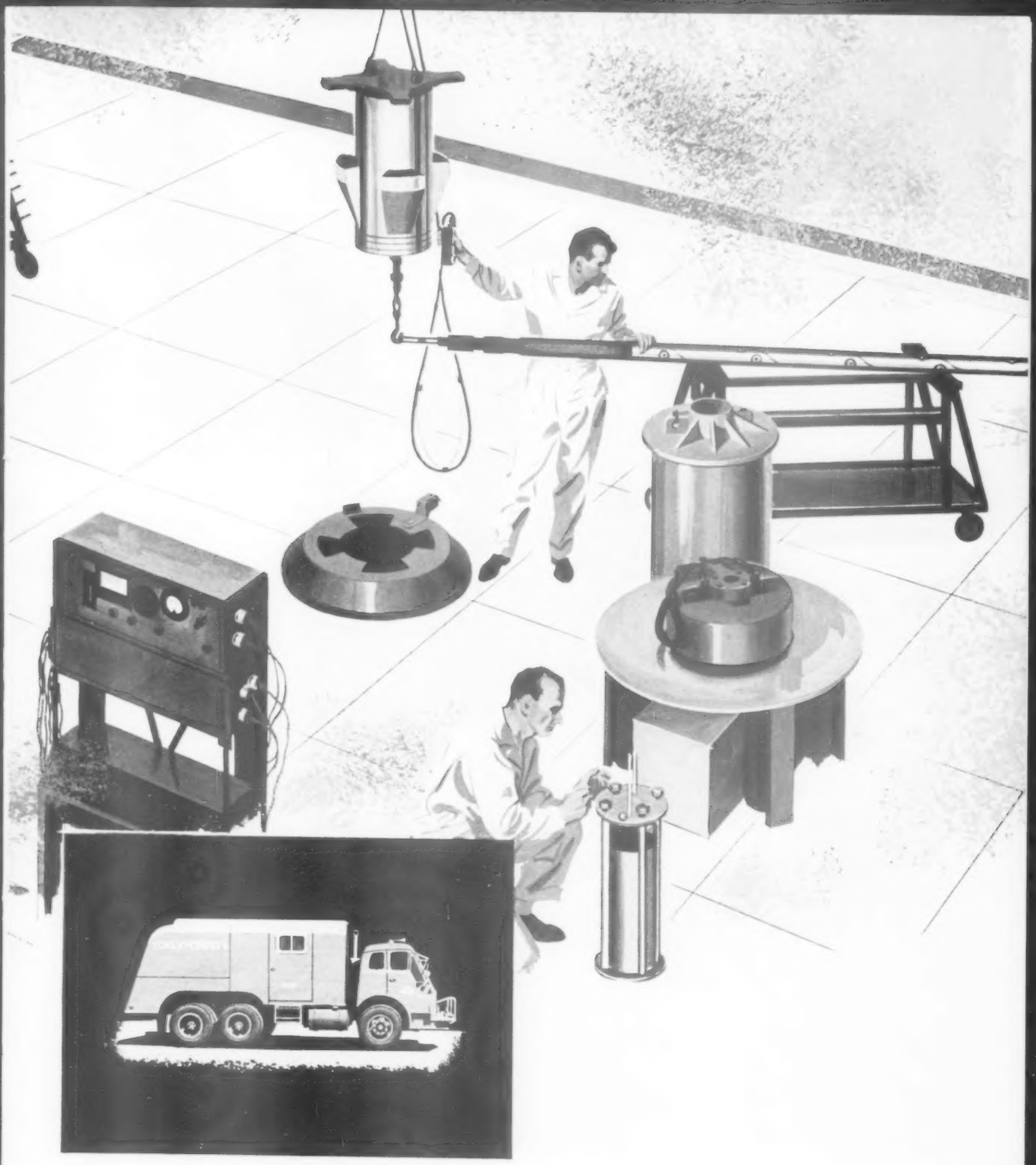
Since 1934, Schlumberger has logged every record depth well. And laboratories such as this, where extensive research into future drilling conditions is conducted years ahead of the actual need in the field, is only one of the reasons why Schlumberger is always ready.

The unparalleled backlog of research and experience which Schlumberger offers is reflected in the quality and service you receive on every survey, regardless of depth.

SCHLUMBERGER

Well Surveying Corporation

THE EYES OF THE OIL INDUSTRY



Schlumberger...to be sure!

Inside Story on POWELL PETROLEUM VALVES

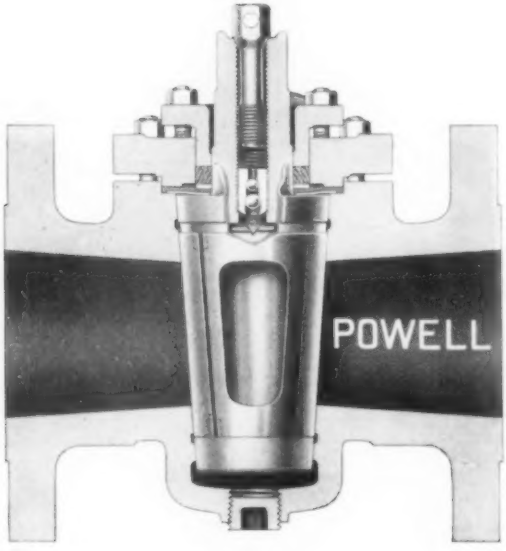


FIG. 2201 (Sectional) -- 200-Pound W.O.G. Semi-Steel Lubricated Plug Valve

Petroleum valves may appear to be alike on the outside. But inside -- in materials, in design, in manufacture -- there can be a world of difference. And the inside story on Powell Petroleum Valves is that every valve has PERFORMANCE VERIFIED.

Only the finest materials are used in Powell Petroleum Valves, and painstaking quality control is rigidly enforced through each step of manufacture

As a final step in manufacture, every Powell Petroleum Valve is subjected to an ACTUAL LINE TEST. Because of Powell's quality control, valve failure is practically unknown. Records from the world over prove it.

Valve users who want one source of supply for Lubricated Plug as well as all types of bronze, iron, steel and corrosion-resistant valves will want full details on Powell Petroleum Valves

Available through distributors in principal cities. If none is located near you -- or if you need help on valve problems -- write direct to The Wm. Powell Company, Cincinnati 22, Ohio.

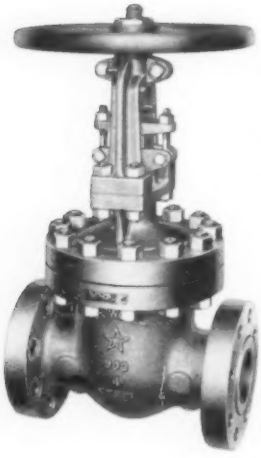


FIG. 9003 -- 900-Pound Steel O.S. and Y. Gate Valve Bolted Flanged Bonnet

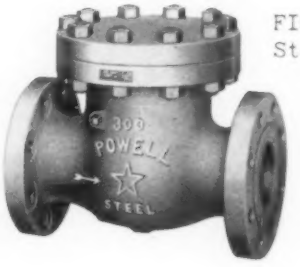


FIG. 3061 -- 300-Pound Steel Swing Check Valve

PERFORMANCE PV VERIFIED

The Wm. Powell Company, Cincinnati 22, Ohio . . . 111th YEAR

POWELL VALVES

BRONZE, IRON, STEEL AND CORROSION RESISTANT VALVES

WHERE CLEANLINESS

SAFETY and

ECONOMY COUNT...

Hospital corridors must be easy to clean and safe from fire. The answer here is wainscoting of K&M Apac.

K&M "APAC" ASBESTOS SHEETS

These two illustrations show but one of many excellent uses for this material . . . use K&M Apac almost anywhere . . . as interior and exterior siding, office paneling, plant and office ceilings, machine shop sheathing, stock room sidewalls, basement partitions, linings for elevator casings; as inside-plant enclosures, as waste and storage bins, and even as hoppers.

K&M Apac is the ideal low-cost, long-life building material. It is made of two practically indestructible ingredients . . . asbestos fiber and portland cement . . . and actually grows harder and more durable with age. K&M Apac cannot burn, rot or corrode, nor can it be damaged by vermin or rodents. Apac is easily sanitized with soap and water.

PRACTICALLY NO MAINTENANCE NEEDED, indoors or out! K&M Apac sheets are highly weather-resistant. Their natural gray color is attractive and no painting is required for protection.

INEXPENSIVE APPLICATION is possible with K&M Apac . . . large 4′ x 8′ sheets can be applied on a big area quickly, and even unskilled labor can cut, drill or shape them on the job without special equipment.

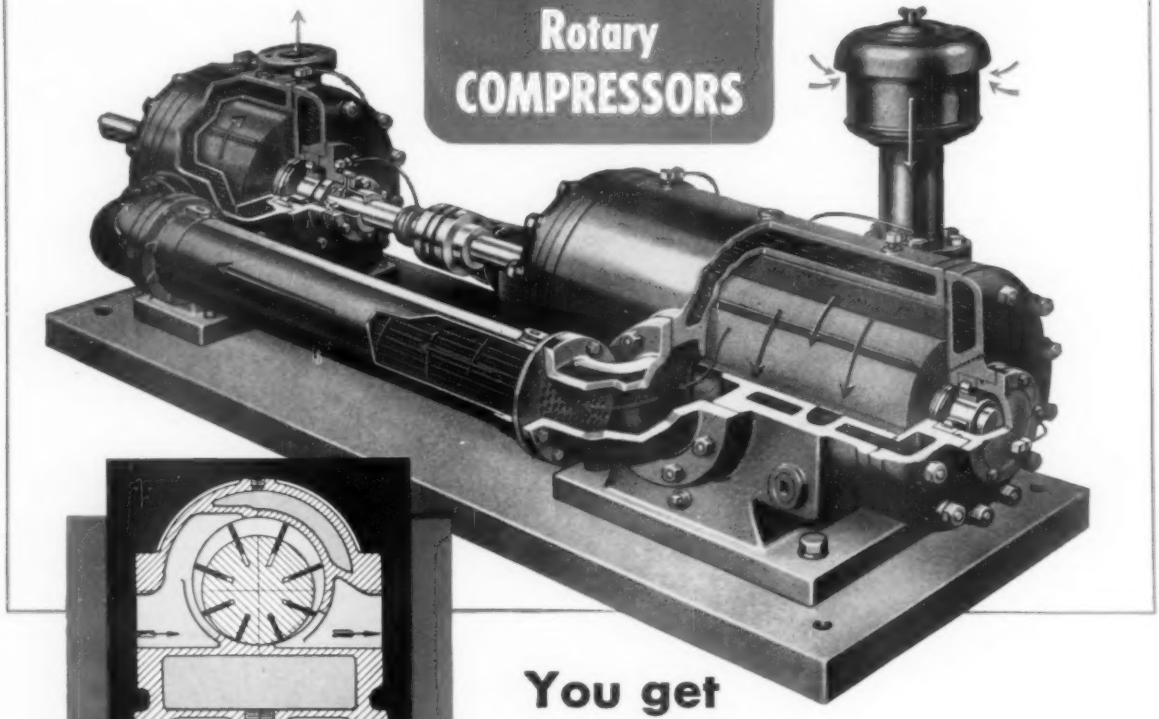
K&M Apac is ideal for this ramp-wall which must be rugged to withstand the continuous scuffing and scraping of heavy traffic.

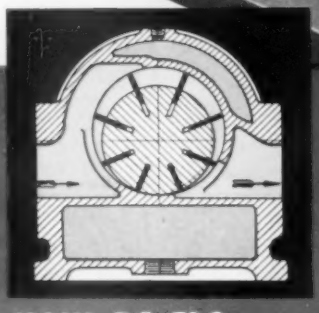
KEASBEY & MATTISON
COMPANY • AMBLER • PENNSYLVANIA

K&M best in asbestos®

ALLIS-CHALMERS

Rotary COMPRESSORS





HOW *RO-FLO* UNITS OPERATE

Centrifugal force moves blades to outside wall to form air chamber.

You get MORE ADVANTAGES

with *RO-FLO* units for shop air, drilling, gas handling

TYPE and SIZE for EVERY NEED

Both single and two-stage *Ro-Flo* compressors are available. Single-stage units for pressures to 50 pounds gauge, and volumes from 42 to 3245 cfm.

Two-stage units in twelve sizes for 250 to 1800 cfm at pressures from 60 to 125 pounds gauge.

Single and two-stage *Ro-Flo* vacuum pumps for vacuums to 0.3 inch mercury absolute, from 22 to 5950 cfm.

Call your nearest A-C office or write for bulletins 16B8244 (two stage) and 16B8126 (single stage). Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin.

1. **CONSTANT EFFICIENCY**— During operation the sliding vanes of the rotor press against the cylinder wall to form air cells. Even if these vanes wear, the rotating force holds them in contact with the cylinder wall so that efficiency and air flow never change.
2. **LOW-COST FOUNDATIONS** — Smooth rotation cuts vibration. This eliminates need for heavy foundations used with reciprocating-type units. Small units can be bolted directly to the floor. Large units need only a simple slab.
3. **COMPACTNESS** — No extra weight or extra size is needed to dampen vibration. Every inch is devoted to air or gas handling.
4. **LOW MAINTENANCE** — There is no wear and tear from shock and vibration . . . no pistons and valves.

Ro-Flo is an Allis-Chalmers trademark.

A-5028

ALLIS-CHALMERS

LQ600-150 LQ600-200

WHY BUY OLD FASHIONED BRONZE GLOBE VALVES THAT DEVELOP LEAKAGE DUE TO SEAT AND DISC WEAR?

LQ600 Valves—with Brinalloy® Seats and Discs—have served in more than 150,000 installations . . . some for five years and more . . . without leakage from seat-and-disc wear.

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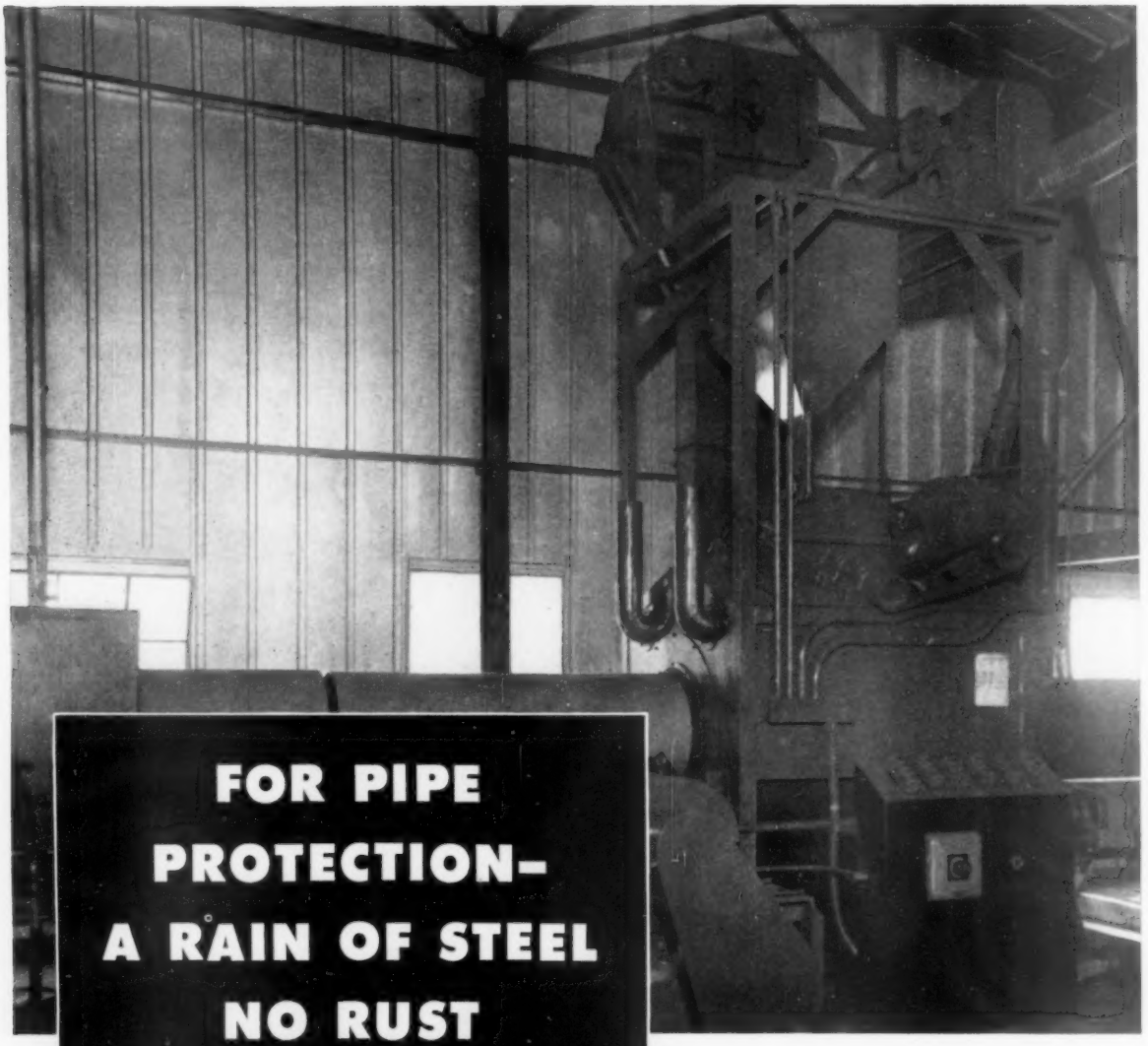
LUNKENHEIMER®

THE ONE *Great* NAME IN VALVES



FOR PIPE PROTECTION— A RAIN OF STEEL NO RUST CAN RESIST!

This innocent looking machine is a Roto-Grit-Blaster. Especially designed by Hill, Hubbell engineers, it showers the pipe with a high-pressure barrage of steel grits that removes every trace of rust or mill scale. Thus cleaned to bare, bright metal, the pipe is etched to better hold the priming coat in permanent bond between steel and hot coatings. Born of Hill, Hubbell know-how, the Roto-Grit-Process is simply—

Another "first" pioneered by the first name in pipe protection

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DIVISION OF GENERAL PAINT CORP. • 3091 MAYFIELD ROAD, CLEVELAND 18, OHIO

Magnolia Co. Installing Oil Industry's First Offshore Microwave Radio Communications

To coordinate production and pipe line operations in the Gulf of Mexico off Morgan City, La., a five-station, four-hop RCA Microwave Radio System, now under construction by Magnolia Petroleum Co., Dallas, will span a distance of more than 75 miles and provide approximately 55 miles of over-water communications.

Dependable RCA Microwave Radio was selected as the communications medium because of crowded VHF radio conditions in the area; also to provide facilities for additional services, such as telemetering and equipment control.

The system will be extended from Morgan City to Burns Terminal, 19 miles away, then 24 miles out into the Gulf of Mexico to Magnolia's Block 51 oil field. From Block 51 the system will extend 23 miles to Block 126 and on to Block 128, nine miles away. RCA CW-20 equipment, operating in the 2000 mc band will be used, with a capacity of 30 channels.

RCA Microwave Specialists will be glad to answer any questions and help plan your installation. Mail coupon for further particulars on use of RCA Microwave Radio in utilities, pipe lines, turnpikes and other applications.

RCA MICROWAVE RADIO . . . performance proved in more than a million channel miles of operating systems throughout the world.

RADIO CORPORATION of AMERICA
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Johnston is tops in testing

and here's why

This is the day of specialization, and Johnston's specialty is obtaining for you the most accurate formation data possible, short of making a permanent completion. Our every effort is to improve the mechanical design of our instruments and make our field service organization more valuable to you.

Johnston has the advantage of experience, too . . . experience dating from 1927. Founded on Drill Stem Testing, the Johnston organization has grown by excelling year after year in this important service.

Johnston equipment and methods are backed by the most extensive engineering research group in the field of subsurface testing. Tangible evidence of this is the exclusive Johnston Tension Type Pressure Recorder which is so sensitive it faithfully records pressure changes of as little as 5/100 of 1 per cent. A built-in thermometer and extra inches of deflection in the tension member (which also has an extremely low thermal coefficient), combine to make this by far the most consistently accurate formation pressure recorder.

JOHNSTON TESTERS

first in drill stem testing

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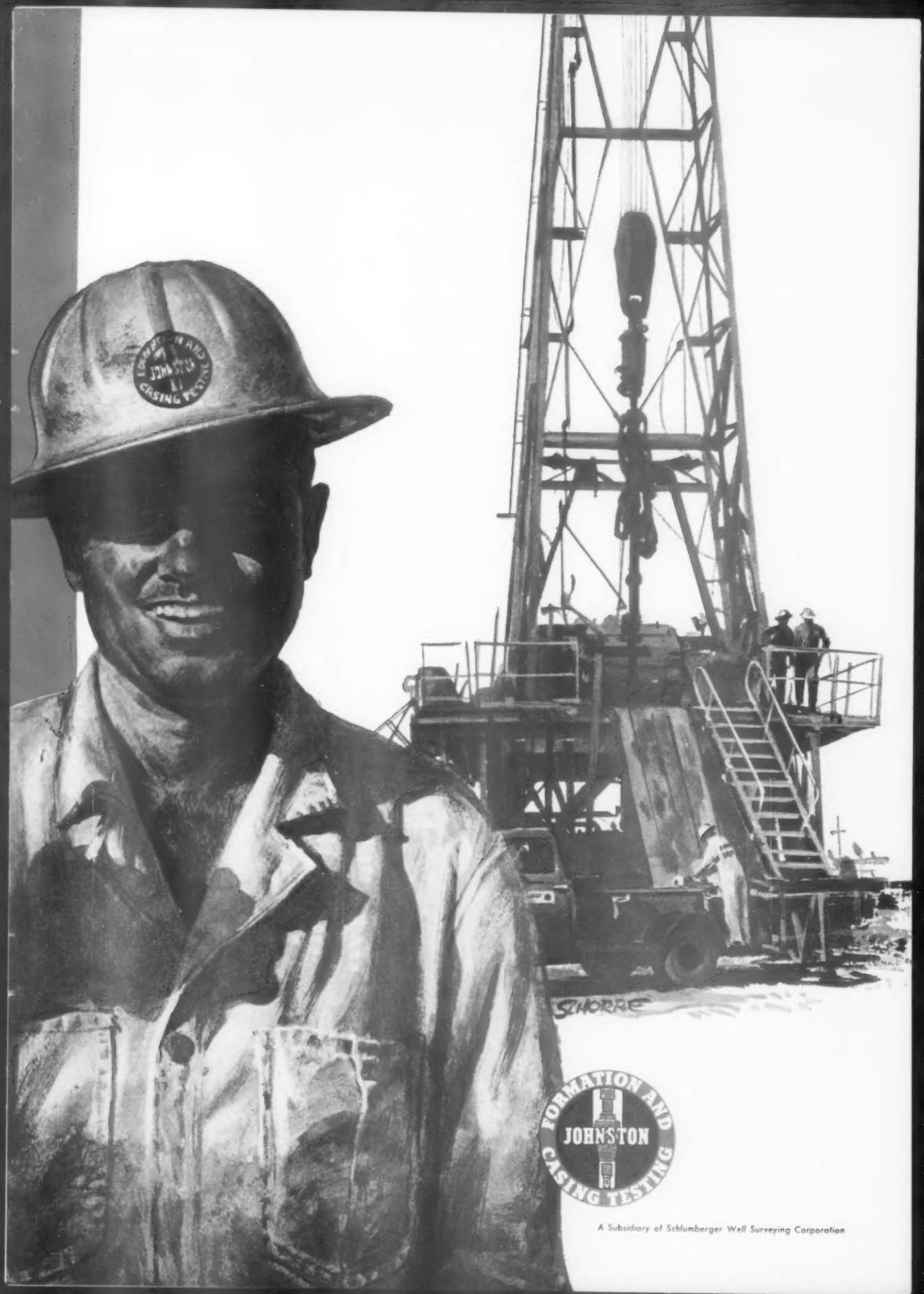
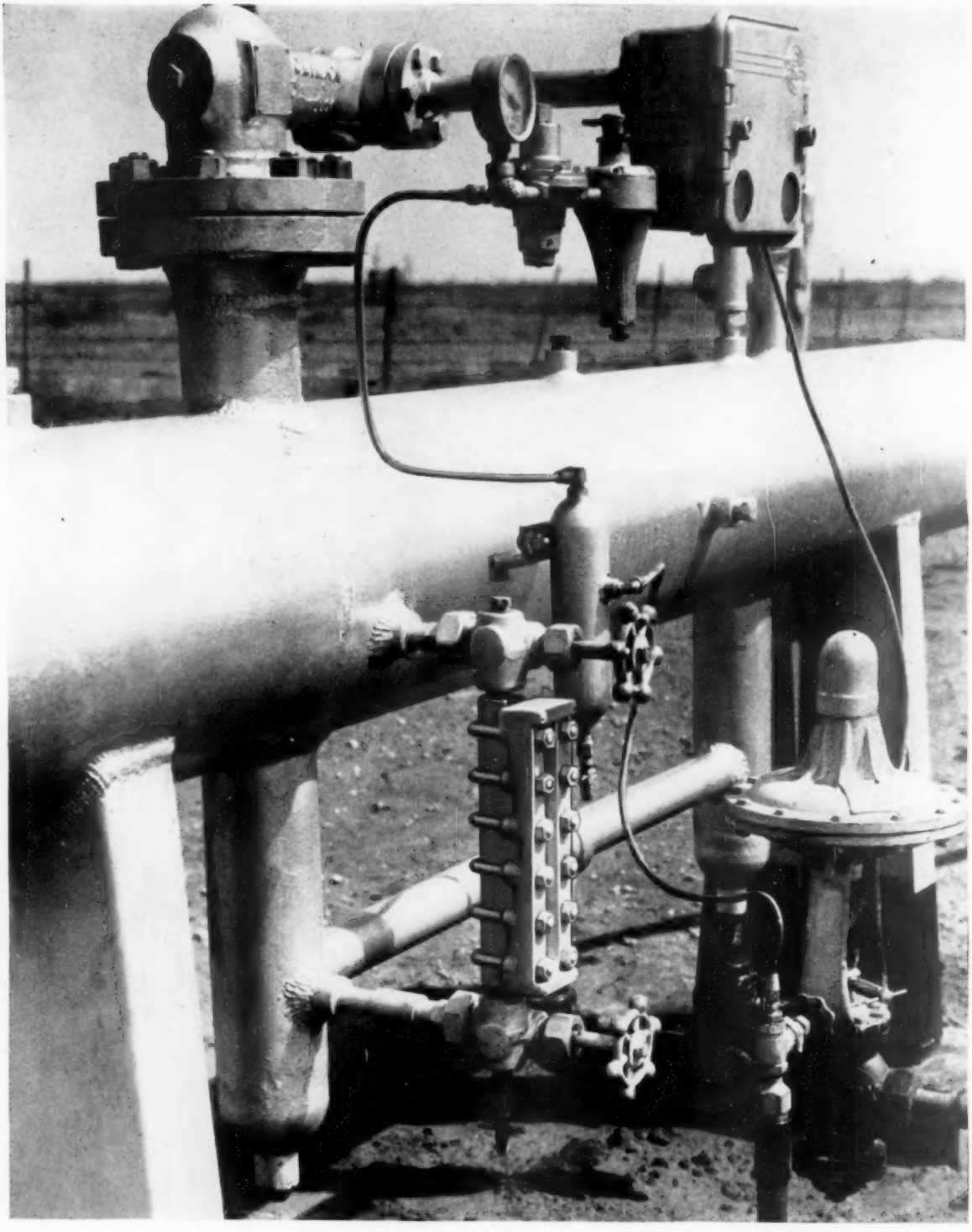
HOUSTON, TEXAS

LOS ANGELES, CALIF. • CALGARY, CAN.



A Subsidiary of Schlumberger Well Surveying Corporation



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At a huge new sports stadium in Minnesota...

"SCOTCHRAP" rolls on easy ...even in zero weather!

"Scotchrap" conforms smoothly, handles easily at high or low temperature — and the pressure-sensitive adhesive sticks tight, too — even at 0°-10°F!

Johnson, Drake & Piper, Inc., General Contractors on the new Metropolitan Sports Stadium near Minneapolis, Minnesota, prefer "Scotchrap" Brand Pipe Insulation for these reasons — and many more. You see, there's no danger when applying "Scotchrap". No special equipment is needed. Just roll it on, and corrosion is sealed out.

"Scotchrap" is a tough vinyl plastic tape that resists abrasion above or below ground, resists galvanic and electrolytic action, resists damage from oil, water, acids, alkalies, weathering and sunlight. *Make sure you get the tape with the green adhesive.*

Sold by the square in 1", 2", 4", 6" and 8" widths — 100-foot rolls. Order a supply today!

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SCOTCHRAP Pipe Insulation

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J & L recognizes a difference in

PLUG VALVES

J&L recognizes—intelligently—a difference in all valves.

There is, definitely, a difference in the quality of *plug* valves.

You expect top performance from special lubricated plug valves recommended by J&L Supply for engineered installations.

But you also get top performance from plug valves stocked by your J&L store for less exacting requirements.

Custom-fitting the valves for your job is only one example of J&L Supply service. Desirable differences in Walworth Plug Valves add up to important economies for J&L customers.

Jones & Laughlin

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SERVING THE UNITED STATES AND CANADA

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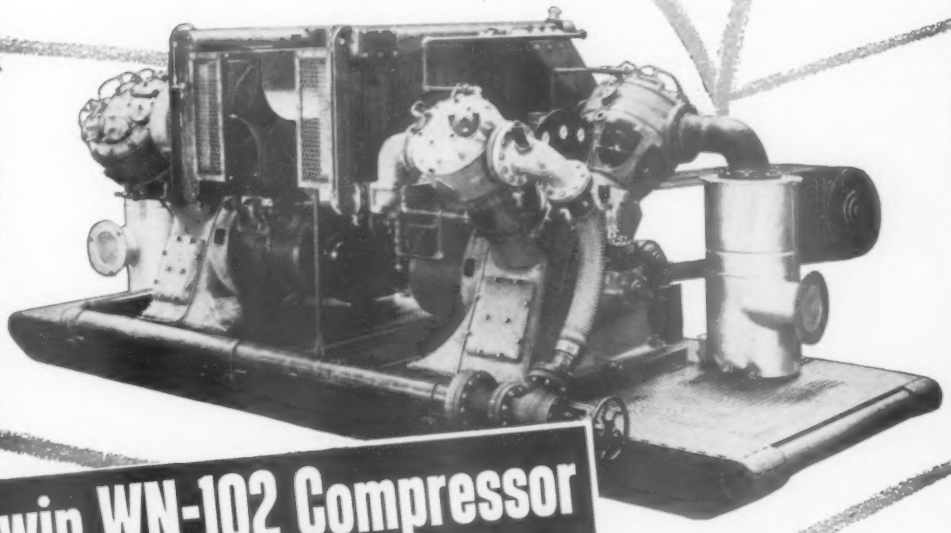
Air Drilling Package =



JOY Twin WN-102 Compressor

Move it in . . . belt it to the drilling engine . . . and begin drilling. That's all it takes to be "in business" with the Joy Twin WN-102. Here's the rundown on *why* the Joy Twin WN-102 is the ideal compressor for your air and gas drilling operations:

- *It is portable . . . mounted on a heavy, oil-field-type skid.*
- *It supplies up to 1512 cubic feet of actual air per minute at pressures up to 200 psi . . .adequate for most drilling jobs.*
- *It is driven by V-belts from the auxiliary mud-pump sheave on the drilling engine . . . requires no additional power in most cases.*
- *It is compact enough to be within highway limits when moving between drilling sites.*
- *It's designed for the job . . . only Joy supplies a heavy-duty, water-cooled package type compressor for this application.*

The Twin WN-102 is but one of the many outstanding Joy compressors which are applicable to air and gas drilling. In the complete Joy line you are certain to find just the compressor to do your job.

For complete information, write, giving full details on requirements, to **Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Write for FREE Bulletin 48-31

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GAS GATHERING COMPRESSORS
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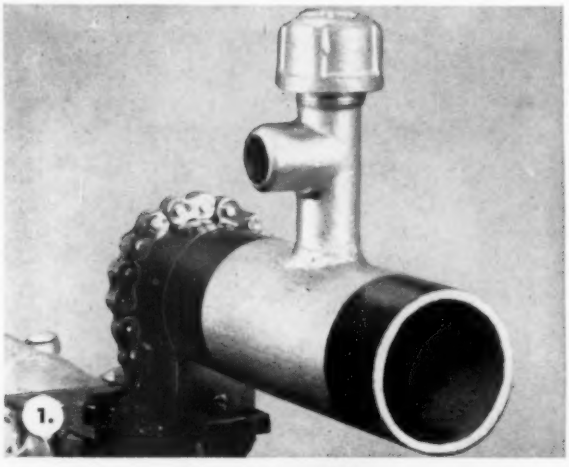
JOY

SPECIALISTS IN THE COMPRESSION AND MOVEMENT OF AIR AND GASES SINCE 1885

The tape that fits to a "T"



A remarkable ability to conform to irregularly shaped contours . . . plus all the advantages of polyethylene

Three easy steps in wrapping a T-joint with *Polyken* Polyethylene Tape No. 940. Note the way this highly conformable tape adapts itself to every twist and turn.

If you have pipe contour problems, this one's for you. Where you need it, it's a valuable new companion product to *Polyken* No. 900 polyethylene tape coating—the ideal coating for straight-pipe runs.

***Polyken* No. 940**—is made especially for use on valves, fittings, ells, T-joints and other irregularly shaped pipe connections. All the superb corrosion resistance of polyethylene . . . plus an extremely high degree of conformability.

No. 940 is a truly balanced product which offers the right combination of elastic memory and dead stretch. Financially, it can mean a nice saving on maintenance.

We'll be glad to figure application costs on your job. Write, wire or phone today: The Kendall Company, Polyken Sales Division, Dept. OG-B, 309 W. Jackson Blvd., Chicago 6, Illinois (WEbster 9-7100).

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POWER Aplenty

for MANY JOBS...at NEW LOW COSTS

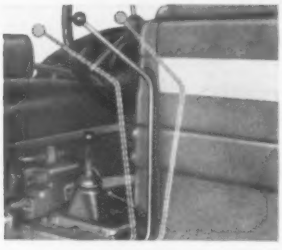
JOHN DEERE
Crawler Tractor

Compact, powerful, and low in first cost, the "420" Crawler is built to deliver years of dependable service at very low cost per hour. Ruggedly built. Easy to start. About 30 engine horsepower. Fewer parts to wear, easily serviced, very low fuel consumption. Your choice of 4- or 5-roller frame . . . track shoes to fit your needs. Optional equipment includes smooth, fast-working single or double hydraulic system, direction reverser, new 3-point hitch for rear-mounted equipment, and 5-speed transmission.

Wide choice of matched working equipment for nearly all jobs, including trencher, shown in action, at left.

JOHN DEERE
Utility Tractor

This wheel-type, stay-on-the-job power unit can boost your profit margin on many kinds of work. Low in first cost, low in upkeep, remarkably low in fuel costs. Cuts "down time" to a minimum because of simple, rugged construction. Highly maneuverable. Has unusual stability when carrying loader, backhoe, or similar equipment. Built low—easy to get on and off, sure-footed on slopes. Optional equipment includes direction reverser, 5-speed transmission, and power-adjusted rear wheels. Shown with loader and backhoe.



DIRECTION REVERSER
. . . a Real Time-Saver

Optional for Crawler and Utility tractors. Lets you move forward or backward in same speed without shifting gears. Investigate—you can save as much as an hour a day in travel time on loading, dozing, and many other jobs!

. . . Now Ready for You!

Some of the Equipment Available

Loaders	Scrapers	Sweeper	Seeders
Scarifiers	Trenchers	Crane	Scoop
Backhoes	Generator	Snow Plows	Fork Lift
Dozers	Pump	Sprayers	Power Saw
Cutter-Bar Mower		Cement Mixer	Gang Mower

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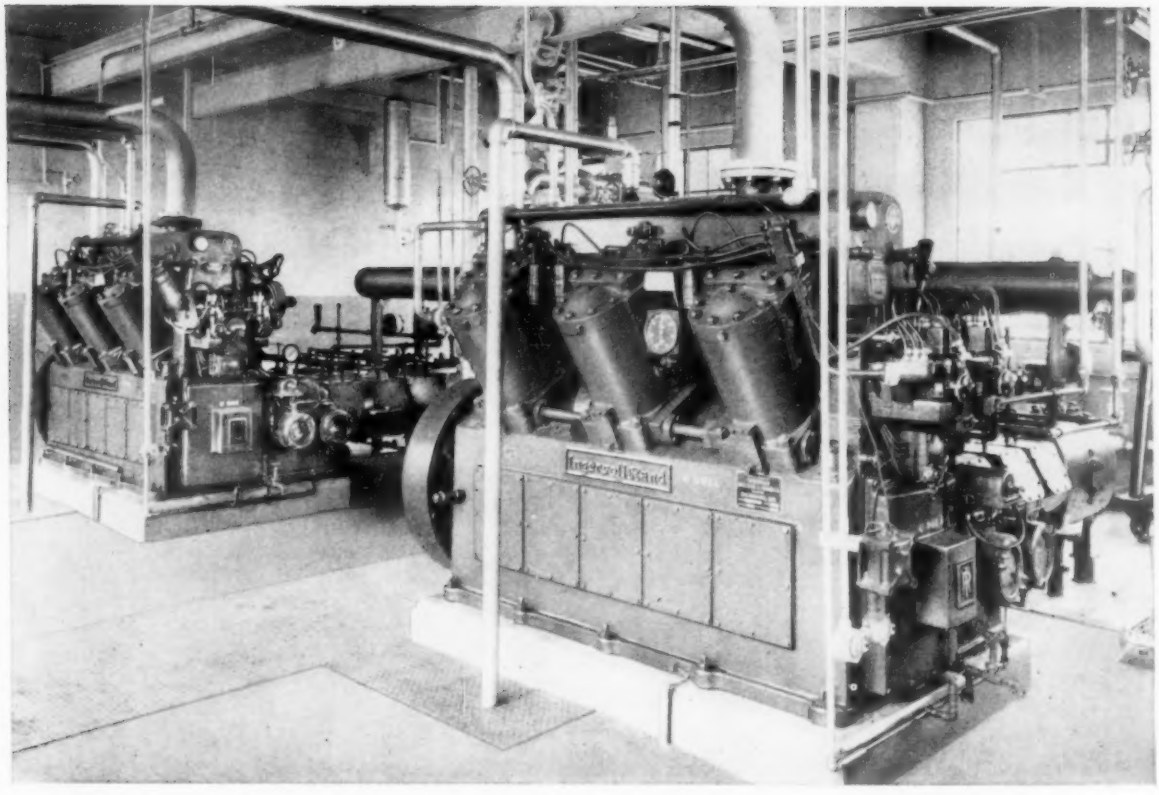

Where a lube-oil plant couldn't use its own product

Although Imperial Oil Limited's new Edmonton (Alberta) plant produces 70,000 gallons of lubricating oil per day, its compressor pistons must run dry.

Of course there is no shortage of oil at Imperial, but the Hydrofining treatment process requires that hydrogen be recycled with no trace of oil being picked up. As in many other catalytic refining processes, any compressor oil carried by the hydrogen would soon reduce the effectiveness of the expensive catalyst.

To recycle the hydrogen without possibility of oil contamination, Imperial uses two heavy-duty Ingersoll-Rand JVG-NL gas-engine compressors featuring special compressor cylinders which are non-lubricated—no oil or other lubricant is used in the cylinders, so none can get into the hydrogen.* Of course, the running gear and the rugged 4-cycle engine end of each unit has oil lubrication.

The 13-million-dollar Imperial plant also employs many other products supplied by Canadian Ingersoll-Rand Co., Ltd., including stationary compressors (with gas-engine, electric, and steam drives), blowers, portable compressors and centrifugal pumps. Ingersoll-Rand builds equipment to suit your needs, too. Call your I-R representative today.

* *Ingersoll-Rand 'NL' compressor cylinders*

Non-lubricated cylinders are specially-built for jobs where oil-free compression is necessary. Regular oil-lubricated compressors should be used where possible because of their lower cost and maintenance, but for applications where non-lubricated compressors are indicated, the most highly-developed and successful units are NL compressors, built by Ingersoll-Rand—the pioneers of non-lubricated construction.

Ingersoll-Rand 4-CYCLE

6-473

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COMPRESSORS • GAS AND DIESEL ENGINES • ROCK DRILLS • PUMPS • TURBO-BLOWERS • AIR AND ELECTRIC TOOLS

ANOTHER LINK IN A MILLION-MILE CHAIN

This 30-foot section of pipe has been coated, wrapped, and is ready for service. It will take its place in the vast underground pipeline network that moves a greater volume than do trucks, railroads, ships and planes, combined.

It will become part of a great subterranean system that is vital to America's everyday living.

Let the facts speak for themselves. The gas industry alone handles over 10,000,000,000,000 cubic feet daily through more than half a million miles of transmission and distribution pipelines. A 185,000-mile pipeline system moves liquid petroleum products across the continent. In addition, there are many thousands of separate pipeline systems used to transport steam for power and heating —and to deliver water through municipal piping.

But there are problems—and one of the most important of these is corrosion. Pipeline companies and utilities must protect their metal pipe against the many corrosive elements that exist underground.

That's where Dearborn comes in. Dearborn's complete line of NO-OX-ID Coatings and NO-OX-IDized Wrappers provide both chemical and mechanical protection against moisture penetration and soil action—protection that lasts for decades—under ground or under water. That's why leading pipeline companies and utilities everywhere look to Dearborn for long-term protection against corrosion leaks and deterioration.

We will gladly consult with your engineers on the best NO-OX-ID Coating and Wrapper Combination for your next pipeline job.

SPECIFY

Dearborn NO-OX-ID®

ON YOUR NEXT PIPELINE JOB

USE THE COUPON FOR MORE INFORMATION

Dearborn Chemical Company, Dept. OG
Merchandise Mart Plaza, Chicago 54, Ill.

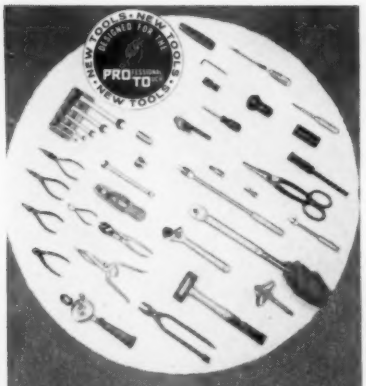
☐ Please send details on NO-OX-ID Combinations.
☐ Have representative call.

Name.....*Title*.....

Company.....

Address.....

City.....*Zone*.....*State*.....



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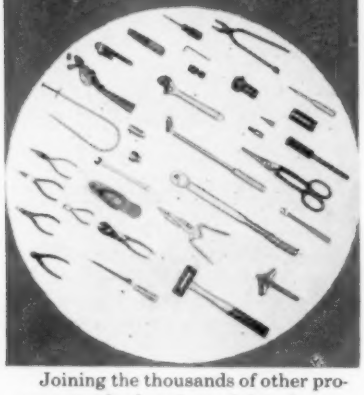

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They Say—

Freedom to Be Responsible

"When we business men talk about freedom from government control, we are not asking for freedom to return to the 12-hour day, to child labor, to immunity from safety standards, and to 'freedoms' of industrial society's early days. Yet we harp so much on the word freedom that I suspect we raise the image of such anachronisms in the minds of many people. I am convinced, referring, for example, to the issue of the natural-gas bill, that the oil industry's attempt to rid itself of needless controls was widely interpreted as a bid for economic license.

JENNINGS

"All of us in the industry know that nothing could have been farther from the truth; that what we were asking for was not freedom to be irresponsible but, rather, the exact opposite. It remains that too many people believed otherwise.

"Perhaps we business men should talk less about freedom and more about responsibility. The two go together, of course: A man can't be responsible in his behavior unless he is free; and he can't be free, for long at any rate, unless he is responsible. The same is true of companies and corporations.

" 'Free enterprise' is the term which we use most frequently in describing ourselves and our economic system, but surely the term 'responsible enterprise' would be equally accurate."

B. Brewster Jennings, chairman of the board, Socony Mobil Oil Co., in the winter American Petroleum Institute Quarterly.

Conservative California?

"At least one member of the California Legislature believes that the state is too conservative in its estimate of the riches in the tidelands oil areas and he wants to be sure the state will be able to collect every dollar that can be made from them.

"Assemblyman Allen Miller of San Fernando has introduced a bill that would prevent the State Lands Commission from further leasing of tidelands to oil companies until next June, by which time a new formula will be

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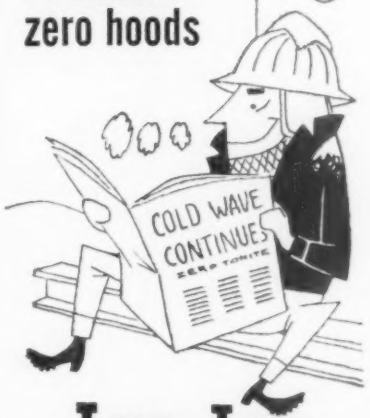
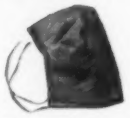


for **T-CAP** *or* **T-HAT**



ZERO HOOD — Head and ear style as shown in top photos or full head - ear - neck style as above. Really keeps the cold out. 2 sizes, medium or large.

WINTER LINING— Makes the "T" hat comfortable in the coldest weather. Fleece-lined—easily interchangeable with regular headband.

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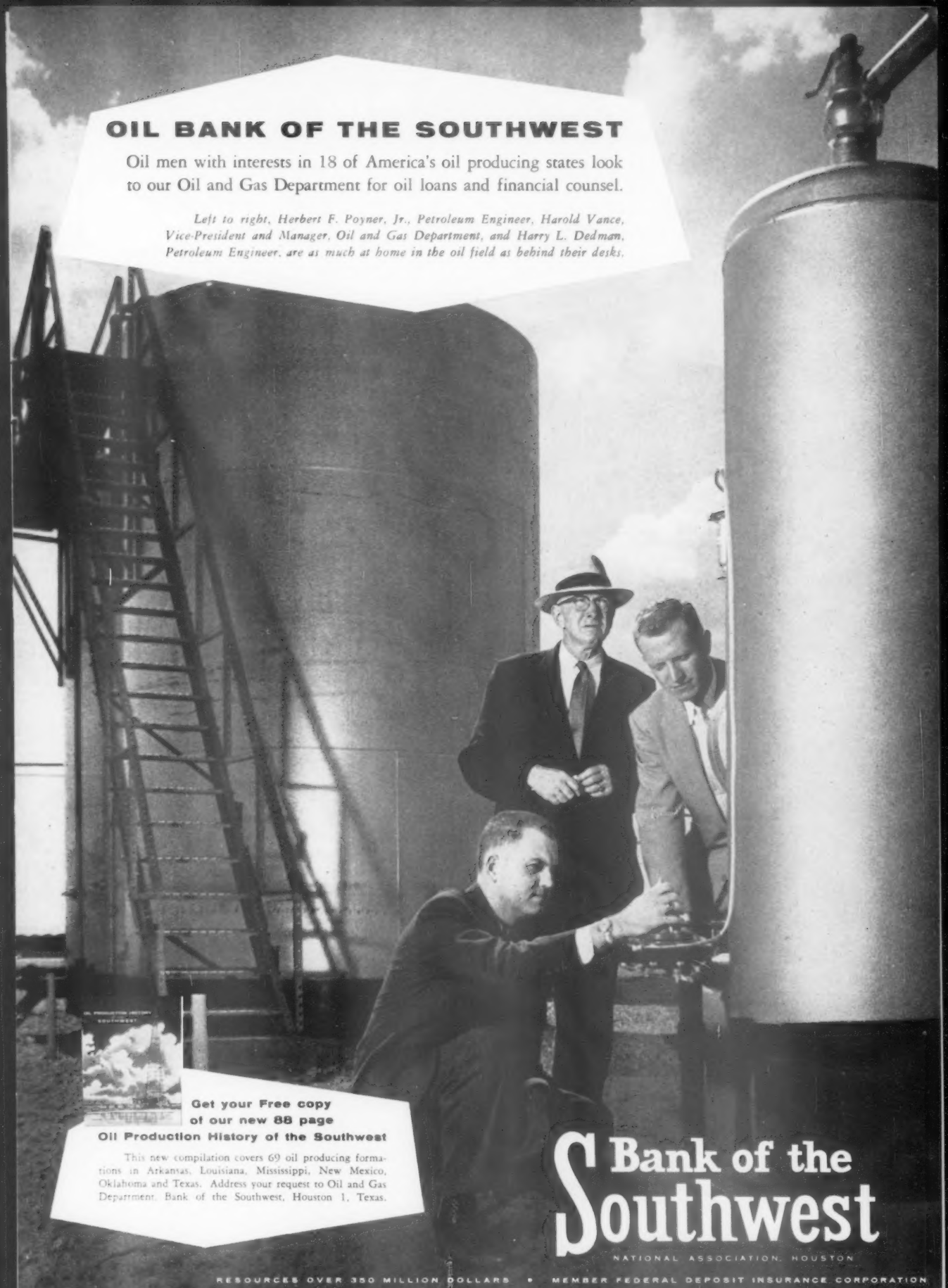

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Left to right, Herbert F. Poyner, Jr., Petroleum Engineer, Harold Vance, Vice-President and Manager, Oil and Gas Department, and Harry L. Dedman, Petroleum Engineer, are as much at home in the oil field as behind their desks.

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This new compilation covers 69 oil producing formations in Arkansas, Louisiana, Mississippi, New Mexico, Oklahoma and Texas. Address your request to Oil and Gas Department, Bank of the Southwest, Houston 1, Texas.

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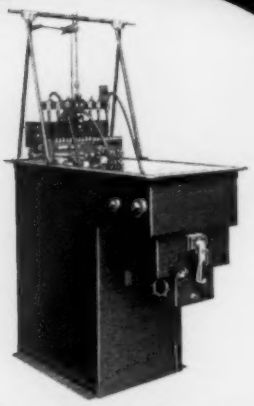
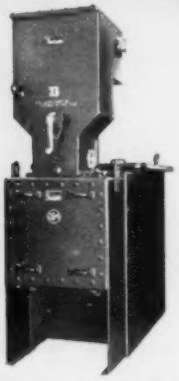
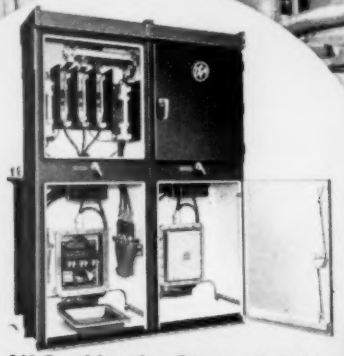


Type AT Combination Starter shown with Contactor and Overload Panel raised above the oil level without disconnecting any bolts or leads—in NEMA 3R enclosure for outdoor mounting, available in 50,000 KVA (certified) interrupting capacity.



Type AM Combination Starter in NEMA 3R enclosure for indoor or outdoor locations—available in 50,000 KVA (certified) interrupting capacity —and VALIMITOR.®



Type AH Combination Starter in NEMA 1 or 3R enclosures for indoor, outdoor or pressurized control room—available in 3 interrupting ratings, 50,000 KVA—POWER FUSED—and VALIMITOR.®

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- Fault currents cleared safely and quickly by high interrupting capacity contactors (certified rating of 50,000 KVA).
- EC&M provides the widest selection of starters for any location...and each is completely wired using anti-syphon wiring.

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evolved revising the royalty figures upward.

"Miller has declared that in his opinion, the present formula, consisting of a flat 12½ per cent royalty plus a cash bonus, is not sufficient. He believes that several excellent oil fields may be found in the tidelands and the black bonanzas concealed therein would bring more money under a new formula.

"This bill will no doubt bring on a fairly brisk debate, especially since it contains provisions regarding the imposition of unitization of the new fields. Unitization of oil fields is the subject that brought about one of the state's bitterest election campaigns last fall."

Editorial in the Bakersfield Californian.

What's Ahead in Foreign Investments?

"During the last 10 years, 1946-55, the free world's oil industry, including American and foreign firms, has invested an estimated $60 billion—$40 billion in the U. S. and nearly $20 billion abroad.

"We estimate a comparable amount will be required, not during the next 10 years, but during the next 5 years and that nearly half of it will be invested abroad. A great deal of this money will be self-generated as in the past, but a substantial amount of outside financing will almost certainly be required.

"We have all been encouraged to see more and more countries around the world embracing the proposition that they must adopt responsible policies toward foreign capital in order to attract it. I believe we are moving into an era in which international flows of private capital will be much more important than in the past."

A. N. Lilley, vice president, The Texas Co., in a speech before the National Credit Conference of the American Bankers Association.

CALENDAR

FEBRUARY

- **6** Petroleum Equipment Suppliers Association, Pacific district spring meeting, Ambassador Hotel, Los Angeles.
- **7-8** Western Petroleum Refiners Association, Gulf Coast regional technical-industrial relations meeting, Lamar Hotel, Houston.
- **8-9** American Society for Testing Materials, Symposium on composition of petroleum, Jung Hotel, New Orleans.
- **13-15** National Association of Corrosion Engineers, Tulsa section, eighth annual short course for pipeliners, Hotel Mayo, Tulsa.
- **14-15** American Institute of Mining, Metallurgical, and Petroleum Engineers, joint annual technical meeting, University of Texas and Texas A. & M.

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In the "Safecase" a solid metal barrier protects the entire face. But, still more important, the *entire back* of the gauge is a thin, ductile plate, designed to open out when subjected to abnormal pressure. Back plate is held firmly to the case by two holding screws and cannot be dislodged by a pressure blowout.

In exhaustive tests it has never been possible to shatter the crystal or create any other dangerous condition in a "Safecase" gauge with its safety-release back. The accompanying illustration shows the result of one of a series of tests in which blank cartridges were fired in the back of the case without even breaking the crystal. Think what that means in safety to operating men!

Yes, an important development . . . but merely the kind you would expect from the manufacturer who originated the "Connoweld" tube, the "Marshalloy" case, the Mastergauge movement and practically all of the major advancements in pressure gauges. Ask for up-to-the-minute information.

Pressure of explosive force merely opens out safety back

Instead of depending on blow-out plugs, entire back of Safecase Gauge is designed to yield to over-pressure. Photo at left shows actual result of firing cartridge within back of case. Safety-release back exhausted pressure. Front remained intact.

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MARSH GAUGES

College, Hogg Auditorium, Austin, Tex.

15-16 National Society of Professional Engineers, spring meeting, Hotel Francis Marion, Charleston, S. C.

18-19 Association of Oilwell Servicing Contractors, first annual meeting, Hotel Texas, Fort Worth.

21-22 Chemical Institute of Canada, eleventh division conference, protective coatings division, Seaway Hotel, Toronto, February 21, and Ritz Carlton Hotel, Montreal, February 22.

22 Natural Gasoline Association of America, Permian basin regional meeting, Scharbauer Hotel, Midland, Tex

24-28 American Institute of Mining, Metallurgical and Petroleum Engineers, annual meeting, Hotels Roosevelt and Jung, New Orleans.

25-27 American Association of Petroleum Geologists, Rocky Mountain section, Rainbow Randevu, Salt Lake City.

27-28 Gas Conditioning Institute, sponsored by the University of Kansas extension, Southwest Kansas Center, Randall's, Liberal, Kans.

MARCH

1 American Institute of Chemical Engineers, Sabine area section, and American Chemical Society, Texas-Louisiana Gulf section, fourth annual joint technical meeting, Lamar College of Technology, Beaumont, Tex.

3-6 American Institute of Chemical Engineers, regional meeting, the Greenbrier, White Sulphur Springs, W. Va.

6-8 American Petroleum Institute, southwestern district production division meeting, Statler-Hilton Hotel, Dallas

8 Ohio Oil and Gas Association, winter meeting, Deshler-Hilton Hotel, Columbus, Ohio.

11-15 1957 Nuclear Congress, sponsored by National Industrial Conference Board and Engineers Joint Council, Convention Hall, Philadelphia.

11-15 American Institute of Chemical Engineers, regional meeting, Philadelphia

11-15 National Association of Corrosion Engineers, Kiel Auditorium, St. Louis

11-21 Quality Control by Statistical Methods, tenth annual short course, sponsored by University of Illinois, College of Engineering and Division of Engineering Extension, Champaign, Ill.

12-13 Subsurface Geology Symposium, fifth annual conference, sponsored by the University of Oklahoma, Norman, Okla.

13-15 Society of Exploration Geophysicists, tenth annual mid-western meeting, Hotel Texas, Fort Worth.

18-21 American Society of Mechanical Engineers, national conference, gas-turbine power division, Sheraton-Cadillac Hotel, Detroit.

20-22 American Petroleum Institute, southern district production division meeting, Washington-Youree and Captain Shreve Hotels, Shreveport, La

25-27 Western Petroleum Refiners Association, annual meeting, Hilton Plaza Hotel, San Antonio, Tex.

25-29 American Society for Metals, Western Metal Exposition and Congress, Ambassador Hotel and Pan-Pacific Auditorium, Los Angeles.

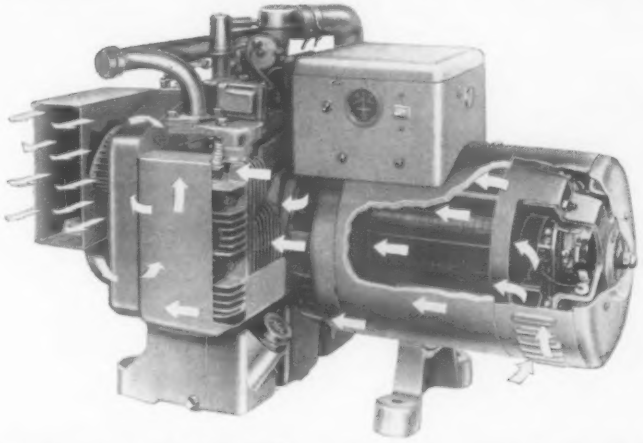
27-29 American Power Conference, Sherman Hotel, Chicago.

APRIL

1-4 American Association of Petroleum Geologists, national convention, Kiel Auditorium, St. Louis.

2-4 Corrosion Control, fourth annual conference, sponsored by National Asso

HOW VacuFlo AIR-COOLING SIMPLIFIES INSTALLATIONS OF ONAN ELECTRIC PLANTS



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Heated air expelled outside through single vent. Units can be enclosed or "buried"

Air-cooled Onan Electric Plants can now be installed in small, enclosed compartments; in isolated or underground rooms; or "buried" within a vehicle, far from the outside air. Previously impossible or difficult installations are now easy and practical with Onan Vacu-Flo cooling.

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ciation of Corrosion Engineers and the University of Oklahoma College of Engineering, University of Oklahoma, Norman, Okla.

7-10 Petroleum Equipment Suppliers Association, annual convention, Palm Springs, Calif.

7-12 American Chemical Society, national meeting, Miami, Fla.

8-10 American Society of Mechanical Engineers, spring meeting, Dinkler-Tutwiler Hotel, Birmingham, Ala.

9-11 American Welding Society, fifth annual welding show, Convention Hall, Philadelphia.

10-12 American Petroleum Institute, Mid-Continent district production division meeting, Mayo Hotel, Tulsa.

11-12 West Texas Oil Lifting Short Course, Texas Technological College, Lubbock, Tex.

11-13 Institute of Radio Engineers, ninth annual southwestern I.R.E. conference and electronics show, sponsored by Houston section, Shamrock Hilton, Houston.

11-13 Institute of Radio Engineers, second national simulation conference, sponsored by Professional Group on Electronic Computers, Shamrock Hilton Hotel, Houston.

11-13 American Institute of Mining, Metallurgical, and Petroleum Engineers, Pacific Northwest Regional Conference, Portland, Ore.

16-18 Petroleum Industry Electrical Association annual meeting, Shamrock Hilton Hotel, Houston.

16-18 Petroleum Electric Suppliers Association, Shamrock Hilton Hotel, Houston.

16-18 Southwestern Gas Measurement Short Course, University of Oklahoma, Norman, Okla.

16-18 National Petroleum Association, fifty-fourth semiannual meeting, Cleveland.

18-19 Texas Petroleum Research Committee and Permian Basin Section of American Institute of Mining, Metallurgical, and Petroleum Engineers, tenth annual oil-recovery conference, Midland, Tex.

24-26 National Gasoline Association of America, thirty-sixth annual convention, Rice Hotel, Houston.

24-26 American Petroleum Institute, Rocky Mountain district production division meeting, Gladstone, Townsend, and Henning Hotels, Casper, Wyo.

25-27 American Association of Petroleum Landmen, third annual convention, Hilton Hotel, San Antonio, Tex.

28-30 Independent Petroleum Association of America, midyear meeting, Buena Vista Hotel, Biloxi, Miss.

29-30 Automatic Control in the Petroleum and Chemical Industries, conference sponsored by the University of Oklahoma, extension study center, University of Oklahoma, Norman, Okla.

29-May 1 Southern Gas Association, annual convention, New Orleans.

MAY

6-8 American Petroleum Institute, annual pipeline conference, Cleveland Hotel, Cleveland.

6-8 American Geophysical Union, thirty-eighth annual meeting, National Academy of Sciences, Washington, D. C.

7 American Gas Association, committee on underground storage, operating section, Mark Hopkins Hotel, San Francisco.

8-10 American Gas Association, Pacific Coast Gas Association, gas supply, transmission, and storage conference, Mark Hopkins Hotel, San Francisco.

American Louisiana Pipe Line protects approximately 600 miles of its pipe coating with

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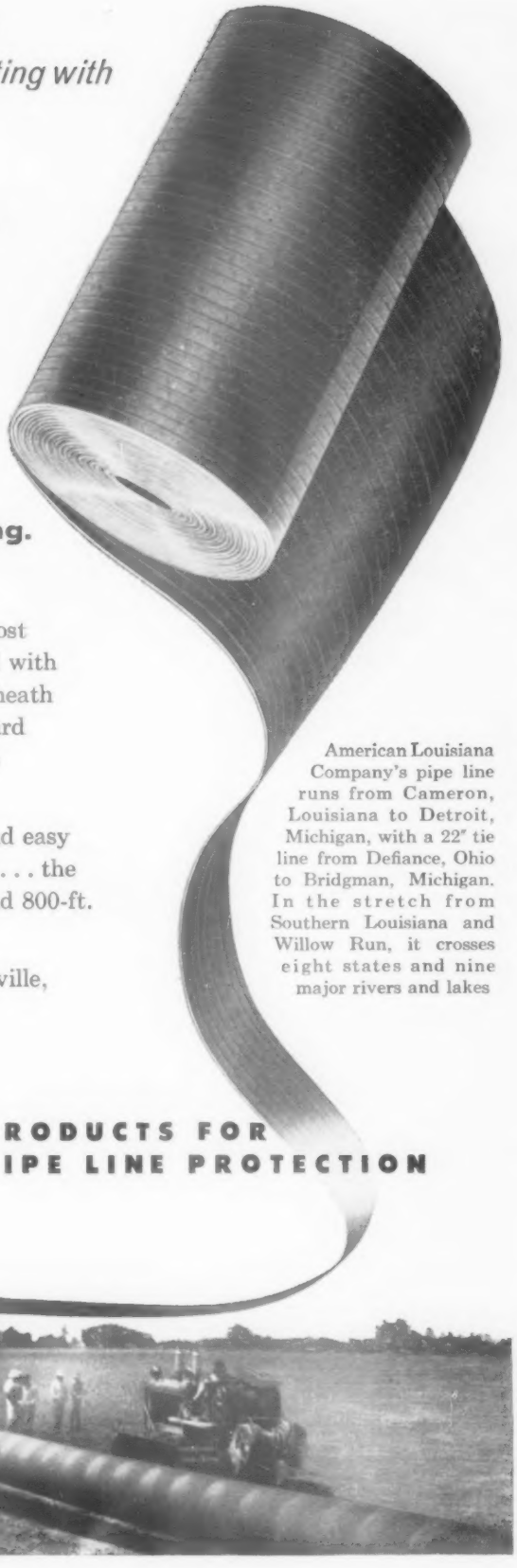

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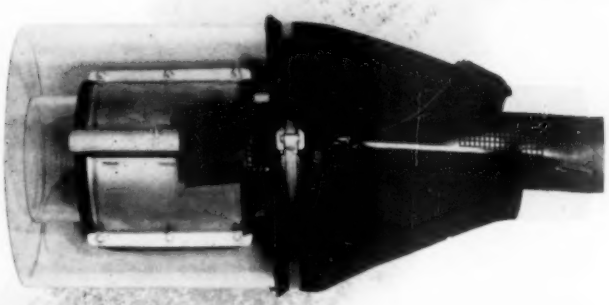

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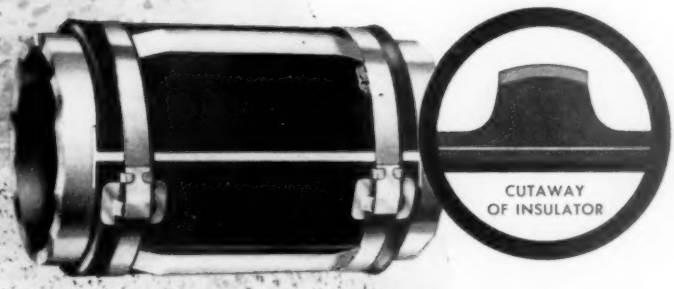
These insulators have superior insulation qualities because of the low moisture absorption and the long life compounded into the neoprene. The wide steel, sled type runners make installation easy. The extra wide band affords a positive grip. Bonded metal-to-neoprene-to-metal, the runner insulates and also permits flexibility to compensate for pipe shifting. Ribbed neoprene lining can be furnished if desired.

The Maloney Model 56 Casing Insulator

Manufactured in sizes from 2" through 12"

Manufactured with neoprene, which is vulcanized to the steel band core and to the rounded steel runners, there is no place to "short-out" between the casing and the carrier line. The steel core is completely surrounded with neoprene and is bonded under heat and pressure to give the same strength as on army tank tread blocks.



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JOURNALLY SPEAKING . . .

Lines of Thought

PIPELINING is a forward-looking business, and pipeliners seldom look backward. But today pipeliners have to look 'way, 'way back into the past, and 'way, 'way ahead into the future.

There's a spate of special articles in this issue about pipeliners' problems of the short-range future. That's all dandy, but it falls on this department to discuss the extremities of the time scale.

Let's take the past first.

A professor at Texas Technological College has just published a book called "Pipeline Archaeology." You might think that this is about Roman aqueducts or Babylonian tile conduits, but it's not. It's about how crews laying lines across New Mexico and Arizona for El Paso Natural Gas Co. dug up truckloads of relics of ancient civilizations.

It's quite a story, and it demonstrates, in a rather odd-ball fashion, how theoretical science can learn things from practical, hustling construction men, and vice versa.

Nobody would have thought that pipeliners would be slowed down because of an interest in arrowheads, pottery, and charred bones thrown up by their ditchers. Nor would anybody have thought that professors of archaeology, accustomed to thinking in terms of eons and millenniums, would conduct their researching as fast as a bulldozer can snake across the desert. But both those things happened.

It seems that for years the profs at several southwestern universities had dreamed of digging around in their localities for evidence of where and how the Aztecs, or Pueblos, or what have you lived before the White Man came. But the usual method of archaeological excavation is to take a few students and a couple of hand shovels out for a week end. But with the desert so big, and so hot, little progress was made.

Then it was learned that El Paso Natural had routed a pipeline right through some of the most promising research sites. The profs sprang into action. No, they didn't try to block the pipeline. But they accomplished something almost as surprising. They got both the company and the crews interested in archaeology.

A cooperative deal was worked out whereby the profs went right along with the construction gang. The pipeliners got so enthusiastic that they helped out in dozens of ways. The profs never had it so good. The ditchers did all the work, and laid bare for study whole strata of ancient camp sites. Archaeology was mechanized for the first time in history.

Now, no doubt, archaeologists will be regular members of pipeline construction gangs, and pipeliners will become authorities on prehistoric artifacts and Stone Age culture.

So much for the distant past. Now for the distant future.

The closing of the Suez Canal has stimulated the imaginations of inventive geniuses all over the world, bringing forth a rash of uninhibited ideas for pipelines. It seems that suddenly everybody wants pipelines. Problems of distance, economics, and terrain must be surmounted. If just a few of these new ideas are adopted, the whole concept of pipeline construction and oil transportation will be revolutionized.

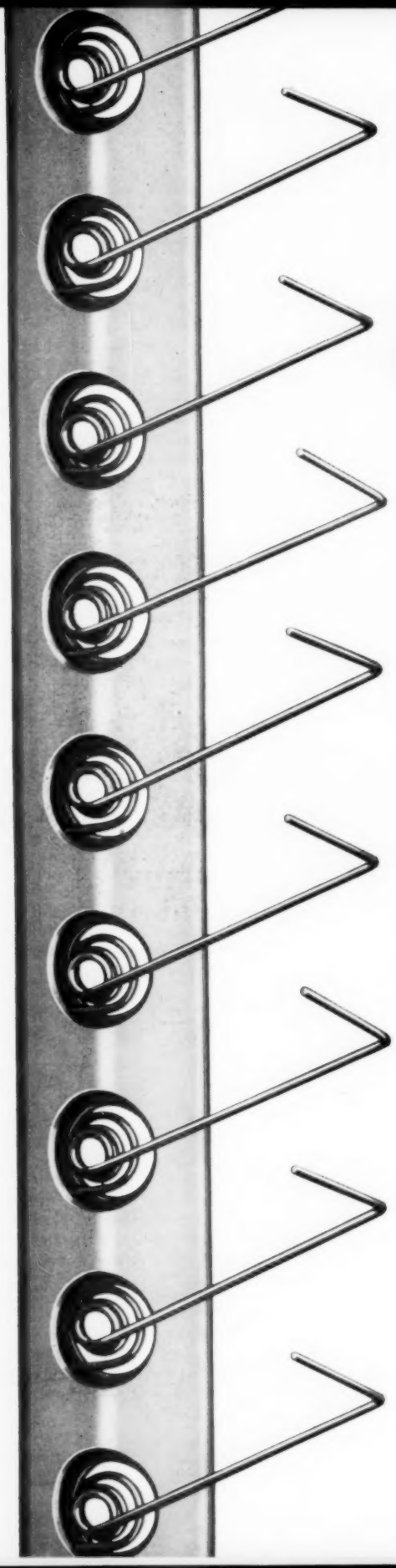
There's a lot of discussion about pipelines from the Persian Gulf to Western Europe. But those dreamers are pikers. A fellow in England has proposed that a pipeline be laid from the oil fields of Alberta, across Canada, and under the North Atlantic to the British Isles. Wouldn't that be something?

The "Operation Pluto" flexible pipeline that was laid across the English Channel to supply the Normandy invasion is getting a big revival. Such a metal hose may actually be laid across Puget Sound to take gas to Vancouver Island. So why not string such lines across all the oceans and make tankers obsolete?

Overland pipelining could change, too. Just the other day we read of a machine that moves across the ground extruding plastic pipe behind it. Great possibilities there, maybe.

No doubt about it, Mr. Pipeliner, your business may be in for some changes. But don't get too carried away with the past and the future. Keep hep to the present by reading the special section starting on page 105 of this issue.

—*Henry D. Ralph.*



is WALL SCRATCHING "POINTLESS?"

NOT WHEN YOU USE Baker ROTATING Wall Scratchers

WITH "PLOW ANGLE" WIRES!

Operators who prefer "Rotating-Type" Scratchers will find the new Baker *ROTATING* Wall Scratcher (Product No. 903) far more effective than typical scratchers with "pointless" trailing wires. See in Fig. 1, how the right-angle bend at the ends of the wires in Baker *ROTATING* Scratchers provides a "plow angle" point which *must* dig in and effectively remove mud cake. Compare these results with the "pointless" action of trailing wires which are *merely dragged over* the mud cake without removing it; see Fig. 2.

Note also in Fig. 3, how the "plow angle" scratching point is maintained over a wide range of clearances—even under slim hole conditions—as each wire automatically adjusts to meet the wall of the hole.

Shock absorbing spiral springs, mechanically held by the *double* body thickness, prevent distortion of the scratcher wires both while running-in the hole and throughout the scratching operation.

Ask the Baker representative in your area for details of spacing and installation. Try this successful aid to "first-time" cementing.

If you prefer RECIPROCATING *Type Wall Scratchers, Baker Solid-Ring* SLIP-ON *Scratchers, or Baker* HINGE-LOK *Wall Scratchers will bring you* CONTROLLED SCRATCHING *by removing the mud cake only throughout the area to be cemented.*

BAKER OIL TOOLS, INC.

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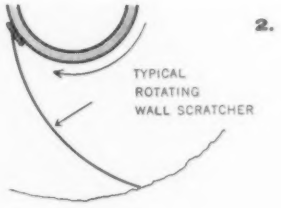
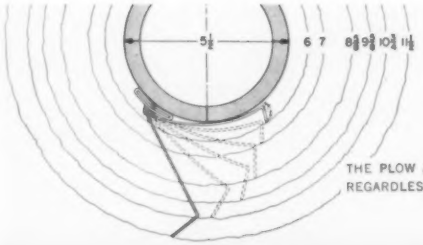




Gas prices won't be held down indefinitely

DRILLING for gas is on the increase again, despite continued federal price control. Last year saw the completion of 500 more gas wells than 1955.

It was the middle of 1954 when the Supreme Court directed the Federal Power Commission to fix wellhead gas prices. The following year gas-well completions declined significantly. But last year the percentages of both wildcats and field wells completed as gassers were back to about their former ratios.

Local conditions explain part of this activity. The big increases were in New Mexico, to meet commitments to a new trunk line; in offshore Louisiana, where the tempo of wildcatting is stepping up; and in Texas which had a bigger gain in total drilling than all the rest of the country put together.

BUT THE BIGGEST REASON is that producers are now convinced that the federal Government will not succeed in holding down the price of gas unduly or indefinitely.

True, the outlook for speedy enactment of remedial legislation is about as gloomy today as it ever has been. Unquestionably this situation is keeping the development of gas-producing properties far below the potential. Passage of something like the Harris-Fulbright bill would bring huge quantities of gas on to the market in short order.

But the experience of 2½ years since the Phillips decision demonstrates that federal regulation cannot keep the price of gas from rising toward a competitive level with other fuels. The obstacle course imposed by the FPC is delaying the economic process, but not stopping it.

This is most notable in the case of new sales contracts, which are not, as such, subject to FPC price control. Some very significant quantities of gas have been dedicated to interstate pipelines at prices which would have been called fantastic only 3 years ago.

The fact that pipelines will pay such prices for new supplies is proof that gas is not pricing itself out of a market. The pipelines know where they can sell this gas, and that they can make a profit on it.

This growing disparity between prices in new and old contracts makes it both harder and more ridiculous for FPC to hold the lid on contract escalations. Even the regulated prices are inching up, and sooner or later producers will find legal ways to speed the process.

COURTS AND CONGRESS can't defy the facts of life indefinitely. And it's a fact that gas is worth more than the prices which FPC is trying to freeze. Confidence in a change keeps producers drilling for gas.

But consumers should note this: Wells drilled don't mean gas at the burner tip. Much of the gas proved up by the 500 new wells is being patiently held for an equitable and economic price.

LOOK! NEW FORD

The boldly modern styling you see in the new Ford trucks for '57 only hints at how deep-down modern they are!

Ford's new Tilt Cabs bring you the most advanced truck design in America today! They're America's lowest-priced* Tilt Cab line. New pickups with Styleside bodies (standard at no extra cost) offer extra loadspace, new higher power, completely new cabs, a new kind of pickup ride. And Ford's "BIG JOBS," ranging from 21,000-lb. GVW to 65,000-lb. GCW, have new engines, cabs and chassis—new strength and durability throughout. See your Ford Dealer for more information on the sweeping changes made throughout the new Ford line.

LOOK again!

They're modern through and through

NEW Ford cabs—completely new—stronger, roomier, smarter! New wider full-wrap windshield. New inboard cab step, new Hi-Dri All-Weather ventilation and new easy-to-read instrument panel!

NEW hydraulic clutch, standard in all models from pickups to tandems. Easier to operate—works like hydraulic brake. Clutch and brake pedals are modern suspended type for extra driving ease!

NEW power advances! New higher horsepower, new freer breathing, new higher compression, new Super-Filter air cleaner. New advancements from camshafts to carburetors! Modern Short Stroke design in every engine—V-8 or Six.

NEW Heavy Duty 302 and 332 V-8's now have 4-barrel carburetors standard. New hood air scoop with thermostatic control available.

NEW riding comfort! Completely new suspension and big roomy cabs with increased visibility combine to greatly improve riding and handling ease.

NEW chassis and body strength! New frames, up to 13% stronger. New sturdier front and rear axles! New higher capacity springs! New, more durable cabs.

*Based on a comparison of factory-suggested list prices

TRUCKS *for* '57

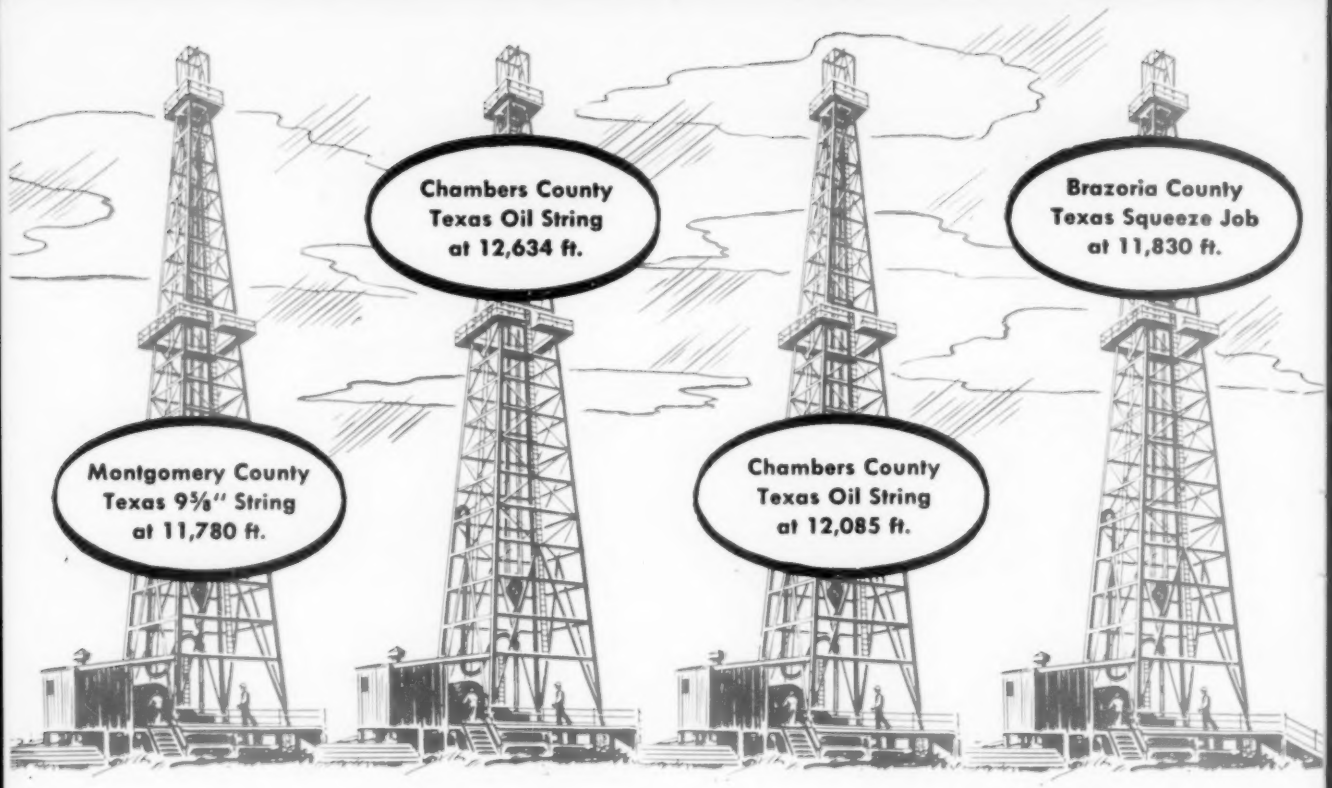
New T-800 Tandem, 45,000-lb. GVW. High torque 212-hp. V-8 engine, 4-barrel carburetor and power steering, standard and at no extra cost.

New Tilt Cab line offers six series ranging up to 60,000-lb. GCW, up to 212 horsepower. Now, all the payload and maneuverability advantages of "cab forward" compactness, plus service accessibility and cab comfort even better than a conventional truck.

For '57 and the years ahead —

FORD TRUCKS COST LESS

. . . LESS TO OWN . . . LESS TO RUN . . . LAST LONGER, TOO!



AS TEXAS GULF COAST WELLS GET DEEPER AND HOTTER

'Starcor' Gives Outstanding Performance

. . . NOW, AS IN 1936

Select Cement to Fit the Job!

● Back in 1936, few wells were drilled below 7500-8000 ft. In some fields, temperatures ranged from 185 to 200°F, with high pressures. Pumping equipment was a long way from what it is today. Operators were often hard pressed to get a good cementing job with "common" cement.

A slow-setting cement was needed—'STARCOR' SLOW-SETTING OIL WELL CEMENT met that need, met it well, as shown by the fact that wells cemented with 'Starcor' a generation ago are still producing, the original cementing jobs holding tight.

Equally outstanding is today's 'Starcor' performance at the greater depths made possible by improved equipment and methods. In the deep, hot Texas Gulf Coast wells, for example (typical jobs, listed above), 'Starcor' is performing perfectly, adding a new chapter to a distinguished service record.

Lone Star offers you four great cements: LONE STAR Cement, standard of highest quality for half a century...'INCOR'*, America's FIRST High-Early, Sulphate-Resistant Cement . . .'STARCOR'* Slow-Setting Oil Well Cement . . .'TEXCOR'* Deep Oil Well Cement. Select the one that fits your job—the extra quality margin is important to you.

*Reg. U.S. Pat. Off.

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The Industry This Week

• **INDUSTRY:** The oil-for-Europe drive is stuck. Top Washington officials now are trying to get it off center by asking states to raise production and refiners to cut runs and change yields. It's a critical problem. P. 60.

Washington is studying another ticklish problem: How to handle imports after the Middle East crisis. Domestic producers are pressing for preventive action now. P. 61.

• **PIPELINING:** Israelis are high-balling their 8-in. crude line from Elath to Bersheba. The 150-mile line will be completed in March.

Chances for the Texas-to-Florida gas pipeline are looking good. Promoters have successfully made changes asked by FPC and now expect to start work on 1,517-mile carrier by spring. P. 86.

Service Pipe Line has grown into world's largest crude-oil system with merger of American Oil Pipe Line's facilities in Texas. P. 88.

Transcontinental Gas Pipe Line plans $110 million expansion program. It'll add 215 million cubic feet daily to system's capacity. P. 89.

• **DRILLING:** U. S. Steel releases its forecast of drilling through 1957. Big steel maker advises: 77,000 wells will be drilled yearly by 1970. It adds up to need for more steel. P. 84.

Russia has eyes on setting new European depth record. Goal for well near Baku is 17,060 ft. P. 97.

The Richardson & Bass world's deepest well in Louisiana has been plugged back 720 ft., where it's flowing 270 bbl. daily. It still retains the title, however. P. 82.

Texaco probably has a new record for open-hole drilling at a California wildcat it had to abandon recently. P. 88.

• **PRODUCTION:** The free-world's crude production hit a 2-year low in November, thanks to the Suez trouble. Middle East output dropped 1,730,770 bbl. daily for month while that of U. S. and Venezuela climbed. P. 95.

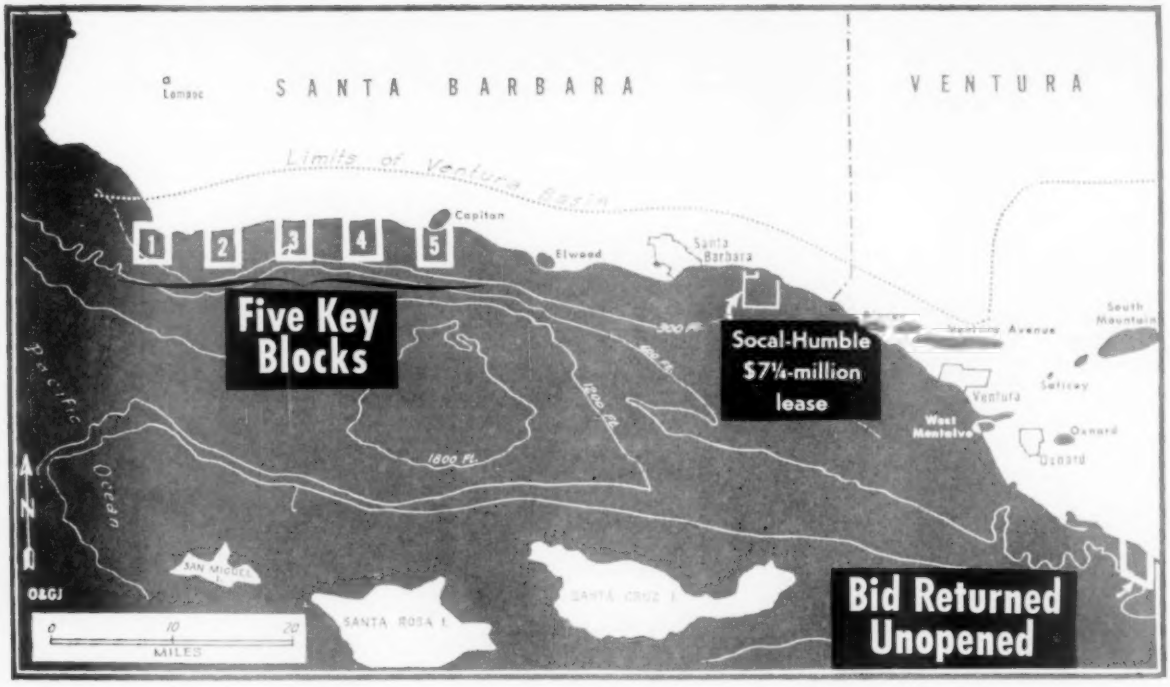
• **EXPLORATION:** California offshore leasing has hit another snag. The State Lands Commission is suspending leasing until the air clears around a legislative battle over what royalty rates will be used. P. 78.

Venezuela has thrown open new concessions for bidding February 11. The acreage is in Lake Maracaibo, Gulf of Paria, North and South Monagas and Barinas. But some Americans think the high minimum-asking price may cool off ardor for the long-coveted blocks. P. 97.

• **PROCESSING:** High level of gasoline stocks made itself felt in the market place last week. Refiners began showing inability to maintain recent products price hikes despite increased costs brought on by higher crude prices. Socony Mobil cut wholesale price of both its gasoline grades in Rhode Island and part of Massachusetts . . . Atlantic Refining sliced one-half cent from its fair-trade prices in eastern Pennsylvania . . . Humble followed Texaco, Gulf, and Conoco in adjusting prices downward by nearly a cent in the Fort Worth- Dallas and Wichita Falls areas of Texas. Phillips and Magnolia met the cut.

The octane race starts the new year with an upswing. Ethyl's monthly survey reports 100-octane-average premium for first time. P. 90.

Texaco lets contract to Bechtel for its new 40,000-bbl. refinery on the Olympic Peninsula 3 miles east of Anacortes, Wash. P. 87.



California Blocks Offshore Leasing

- **Sudden decision of lawmakers that perhaps the royalty rate should be raised throws a wrench in offshore plans**

- **It means another year before key areas can be leased and wildcats can further evaluate tideland prospects**

LOS ANGELES. — A month ago, 1957 looked like a big year for offshore activity in California.

This month operators are reading another chapter in the same old story —delay. The State Lands Commission last week suspended all leasing of state-owned lands. There won't be any more leasing until the state's lawmakers can study the offshore regulations—and the legislature isn't scheduled to convene again until March.

The moratorium will delay the tidelands leasing program by about 1 year. An even longer delay will occur if the leasing laws are substantially changed.

Whether or not present laws are changed, the State Lands Commission will have to start all over again in processing the Point Mugu leases and the five Elwood parcels (see map).

F. J. Hortig, State Lands engineer, told the California Petroleum Press Club here last week that approximately 1 year was required to process them the first time.

"We possibly could cut this down to 6 months on the second go-around but even so it will probably be next December or January before they will again be bid on," Hortig said.

If the legislature should adjourn next June 14 without taking action on the proposed changes, Hortig expected the commission would immediately start reprocessing the areas for bidding. But should the Cunningham-Shell Act be revised and not signed by Gov. Goodwin Knight, then the new laws would not be effective until next September.

The main thing bothering the legislature is the royalty rate of a flat 12½ per cent on wildcat acreage.

Several bills are now in the hopper which would knock out the flat 12½ per cent wildcat rate and the 16⅔ per cent sliding scale on development acreage and lump them all into a sliding scale rate beginning at a minimum 12½ per cent.

Under this plan, the controversial requirement of classifying lands would be cut out *(The Oil and Gas Journal, January 28, page 124)*.

The proposed changes in wildcat royalties are part of a legislative program backed by the staff of the commission. Hortig explained that the reason for the proposed change is that the commission staff and many legislators favor long-term royalties over large cash bonuses. The state's income will be higher under such a procedure and can be used to better advantage, he declared.

A group of small producers also started a drive in Sacramento to seek legislation limiting the number and size of tideland leases any one company can hold. They proposed a limit of 10 on the number of leases and an acreage limit of 23,040 any one company could hold either a total or partial interest in.

The outlook . . . California oil men agree that when activity on these new tidelands finally gets under way, the payoff should be tremendous.

Qualified oil executives are predicting production eventually will hit 100,000 bbl. daily from these submerged lands. Other estimates are that three-fourths of California's future oil reserves will be found in these lands.

Finding them won't be easy, however. Operators planning to develop tideland leases from offshore structures will face water depths up to 1,200 ft. within 2 or 3 miles of shore in some places. Water 300 ft. deep is found in two of the five parcels between Point Conception and Elwood. Offshore structures must be located at least a mile from the beach and be

designed to accommodate at least 20 wells.

The bulk of California's current offshore production is coming from wells slant drilled from beach sites on leases awarded before the Cunningham-Shell Act of 1955. This production amounts to nearly 46,000 bbl. daily, of which 38,000 bbl. is coming from the huge Huntington Beach field.

The only tideland lease being developed from other than an onshore site is that of Monterey Oil Co., which operates from an earth-filled island 1½ miles off Seal Beach. Monterey has drilled 17 wells from the island.

Three different conditions now prevail under which the state's tide and submerged lands can be or were offered for lease. They include:

. . . **The 135 miles** opened up by the Cunningham-Shell Act.

. . . **State-owned** submerged lands in danger of being drained by offsetting production.

. . . **Beach cities** with title to their own tidelands.

Cunningham-Shell Act . . . Since this liberalized lease law was passed in 1955, here's what has happened:

. . . **A 500-acre parcel** off Summerland went to Tidewater last summer for $75,000. It is classified as being within a known producing structure, thus calling for a sliding-scale royalty rate.

. . . **A record price** was paid by the Socal-Humble team for its 5,500-acre parcel (see map). They have 5 years, at an annual rental of $1 an acre, to find oil. The lease provides a 12½ per cent royalty, since it is on wildcat acreage. This was the only wildcat lease awarded before the lid was clamped on.

. . . **A 5,500-acre block** off Point Mugu was slated to go on the block January 18 but was taken off the market when the commission suspended leasing activity. This parcel had attracted only one bid, by Superior Oil Co. which was returned unopened.

. . . **Five 5,000-plus acre parcels** between Point Conception and Elwood were also in the processing mill when the lease ban was put on. Bids on these parcels, which have now been withdrawn, were to be opened March 1.

. . . **Interest has been shown** by two companies in the 7,500 acres between Seal Beach and Huntington Beach. Standard of California and Union Oil Co. have asked for bidding on this acreage but action has been held up pending settlement of an ownership dispute between the state and Orange County. The county, claiming ownership, has awarded a lease on the acreage to American Marine Oil Co.

The commission has adopted a checker-board policy in awarding leases under the new law. The pattern is to award only every other parcel in a string of parcels, keeping the alternate leases off the market.

The commission's hope is that if the awarded parcels prove productive, the adjoining parcels will attract much higher bonus bids when they are put on the block. This policy was followed on the Point Conception-Elwood parcels where originally nine were asked to be put up. The 5,500-acre parcel at Point Mugu also was originally the middle of three requested to be bid on by Superior.

Before Cunningham-Shell . . . Here is the status of leases awarded prior to the Cunningham-Shell Act:

. . . **Coal Oil Point.** Operations are at a standstill. Richfield, as operator for itself, Honolulu Oil Corp., and Signal Oil & Gas Co., drilled two dry holes on the 3,800-acre lease last year.

. . . **Rincon.** Richfield is building an island ½ mile seaward from the beach from which to develop this 1,175-acre lease. Last year the company came up with some promising evaluations by core drilling from floating barges.

. . . **West Montalvo.** Standard of California is developing the offshore portion of the deep Colonia pool by slant drilling from the beach. Standard has a 90-acre offshore lease here.

. . . **Redondo Beach.** Signal has completed its sixth well slant drilled from an onshore site. Under terms of its lease with the city Signal must now conduct any future drilling from an artificial site beyond the breakwater. The company is waiting out the stormy season before making a decision. Signal is operator for itself, Artnell Oil & Gas Co., and Reserve Oil & Gas Co. on this lease.

. . . **Los Angeles Harbor.** The city recently awarded a lease to Standard of California and four individuals on 1,350 acres in the west basin of the harbor. Prior to that, all city-owned lands outside the breakwater were leased to the Los Angeles Harbor Oil Co. An additional 3,400 acres of the harbor area within the breakwater will go on the block soon.

. . . **Seal Beach.** The eighteenth well is being slant drilled on this 1,400-acre site from Monterey's earth-filled island off Seal Beach. The island is designed to handle 70 wells.

. . . **Huntington Beach.** The state's only gulf-type drilling platform is working on a core-hole program for Monterey on a 1,280-acre lease a mile offshore. This lease is held jointly by Monterey, Humble, and Seaboard Oil Co. Operations have been suspended following two dry holes on a 1,355-acre lease immediately offshore.

A 640-acre lease adjoining the two Monterey leases here is also idle after two dry holes were drilled from onshore. This parcel is held by Signal, Richfield, and Hancock Oil Co.

Douglas Oil Co. brought in two wells last year on a 320-acre lease next to the idle Signal-Richfield-Hancock concession. The 7,500 acres between Douglas' activity and Monterey's island at Seal Beach is the acreage being disputed between Orange County and the state.

. . . **West Newport.** Some 800 bbl. daily is being produced from 16 wells slant drilled from an onshore, landscaped site on the north edge of town.

Core boats busy . . . Nine core boats now are at work on evaluating offshore prospects. Of these, two are basically different from the others.

The C.U.S.S. group (Continental, Union, Shell, Superior) vessel is the largest in the fleet. Like most of the others, drilling is carried out in a well cut through the center of the ship.

Ocean-floor drilling controls operated from the surface are used. Unlike the others, this 266-ft. converted Y.F.N.B. is capable of drilling actual wells to depths of 12,000 ft. with 4½-in. drill pipe. The other vessels use core-hole rigs and drill tubing.

Another unique feature of the C.U.S.S. group barge is a method for handling and racking drill pipe which eliminates the need for a derrickman. The pipe is pulled and racked in doubles by a system of elevators and chain hoists. The pipe is racked in a slotted conveyor system which has space for 9,600 ft. of pipe.

General Petroleum Corp. just commissioned the first self-propelled center-drilling ship to join the fleet. The others are towed to location.

Besides these two, Richfield has two boats, and Standard of California, Western Gulf Oil Co., Humble, The Texas Co., and Submarex, Inc., have one each. Submarex is operating all the barges except Union's and GP's.

Under the coring rules, operators may carry on unrestricted core drilling on unleased lands if tests are kept shallower than 500 ft. Deeper than 500 ft., a permit is required. Even then the hole may be taken only to the first correlative stratigraphic bed.

The high cost of such operations, plus the prospect of tremendous costs when actual development drilling gets under way, has caused many oil companies to pool their tideland efforts.

One such group is composed of Continental, Union, Shell, and Superior (C.U.S.S. group). Another is the G.O.R.S.H. group of GP, Ohio Oil Co., Richfield, Signal, and Hancock.

Officials spurred to action as . . .

. . . Oil-For-Europe Drive Gets Stuck

● Government asks states to boost output and refiners to cut their runs; European diplomats pressure U. S. to do something after oil movement abroad slows to trickle

WASHINGTON.—The great plan to supply Europe with oil has fallen down. The federal Government is on the spot and is moving to save the program.

The crisis became apparent when mid-January statistics were revealed. They showed Gulf Coast shipments of crude sank to nearly nothing at one time in January. Only 75,000 bbl. daily of crude moved during the week ended January 16. For the same period a new over-all low total of 275,000 bbl. daily of crude and products was shipped. As a result:

. . . **European diplomats** are putting the screws on the State Department to step up shipments.

. . . **Congressional committees** are preparing to investigate the whole government-industry setup. First of these probes will start this week.

. . . **Differences among oil** men themselves threaten to split the industry wide open.

. . . **And Gulf and East Coast refiners** are facing possible government orders to cut back runs and cut gasoline yields to get more heating oil.

The slump in oil shipments is underscored by this fact: The 275,000 bbl. daily moved in the week ended January 16 was nearly 200,000 bbl. less than reported the preceding week. Also it compared unfavorably with totals shipped by the industry itself just before the Middle East Emergency Committee took over in December. In those 2 weeks shipments averaged 944,000 and 636,000 bbl. daily.

Government acts . . . Assistant Interior Secretary Felix E. Wormser led off government moves last week to save the program. He called on:

. . . **States** to increase their allowables.

. . . **Refiners** to reduce their runs to provide added oil for export.

Wormser declared the industry has done little more than draw on aboveground stocks.

Up to mid-January, shipments exceeded 33,000,000 bbl. Of this over 18,000,000 was crude oil. During the same period crude stocks were reduced by 30,000,000 bbl. Those on the East and Gulf Coasts were cut by over 18,000,000 bbl., or about what was shipped to Europe.

"In effect," Wormser said, "the shipments of domestic crude oil to Europe have come from inventories rather than domestic production." This, he added, has reduced crude stocks to "a level considered a minimum for national security reasons."

"Crude shipments to Europe can be maintained without endangering our own position only by increased output and reduced refinery runs. Fuel oil, Europe's most critical product, will be short of meeting needs this quarter by 25 to 30 per cent.

Critical time . . . "The next 60 days will be an especially critical period for Western Europe," Wormser said.

"Any additional fuel oil supplies which can be made available by U. S. refineries through adjustments of yields will be of great assistance."

Domestic gasoline stocks are at an all-time high, he said. Gasoline yields can be reduced without running the risk of a shortage.

What next? . . . Administration officials agree the Government has no power legally to dictate production allowables.

Even under the stiff controls of World War II, it went no farther than suggesting to the states what their production should be.

Mobilization Director Arthur S. Flemming has deliberately avoided any statement or action that might be interpreted as an effort to dictate what the states should do. ODM officials explain he is anxious to avoid anything that could be thought an attempt to interfere with the powers of the states.

The question of refinery operations is in a different class. Flemming and his legal advisers last week gave this interpretation: From the legal point of view, the Government has authority under the Defense Production Act to order changes in refinery operations in the interest of national defense.

A change in yields would provide more heating oil needed in this country. That would be in the interest of national defense, they explained. At the same time the cutback in refinery runs would release crude for shipment to Europe.

Flemming said he was waiting to see the reaction to Wormser's appeal for more production and refinery changes.

Where Gulf Coast Oil Is Going

(Thousands of barrels per day)

Destination—	Crude	Gasoline	Kerosine	Distillate	Residual	Other	Total
Nov. 1-7							
U. S. East Coast	311	564	70	392	147	53	1,537
W. Europe		25				16	41
Nov. 8-14							
U. S. East Coast	642	704	153	550	115	65	2,229
W. Europe	81	32		65	25	9	212
Nov. 15-21							
U. S. East Coast	584	514	104	534	185	91	2,012
W. Europe	233	15	2	68		3	321
Nov. 22-28							
U. S. East Coast	473	639	141	487	134	76	1,950
W. Europe	609	59	14	208	53	1	944
Nov. 29-Dec. 5							
U. S. East Coast	647	590	130	496	138	84	2,085
W. Europe	355	40	22	212	5	2	636
Dec. 6-12							
U. S. East Coast	561	583	159	600	123	56	2,082
W. Europe	201	26		155	1	4	387
Dec. 13-19							
U. S. East Coast	654	577	130	597	99	29	2,086
W. Europe	221	77	8	105		10	421
Dec. 20-26							
U. S. East Coast	512	655	198	612	202	42	2,221
W. Europe	393	107	9	68		4	581
Dec. 27-Jan. 2							
U. S. East Coast	650	551	124	605	131	39	2,100
W. Europe	294	41	3	81	45	2	466
Jan. 3-9							
U. S. East Coast	770	594	129	705	96	55	2,349
W. Europe	210	42	27	115	59	16	469
Jan. 10-16							
U. S. East Coast	761	716	173	703	132	39	2,524
W. Europe	72	53	11	72	57	10	275

"If the results are not favorable, we will see what additional steps can be taken, if any," he said.

Major oil company officials in New York, however, claim ODM has no legal basis for changing refinery schedules or altering crude production. It can recommend but not dictate in nonmilitary matters, they said.

ODM officials admitted that the first guess—that tanker capacity would be the major factor in supplying Europe—proved wrong. The MEEC has succeeded in its assignment of getting enough tanker space to handle the oil. It is the crude supply which has been the limiting factor.

Maybe a conference . . . A number of angles in the situation now are being explored.

Thought is being given in Washington to a meeting of federal and state officials to discuss crude supply. This would cover such matters as the thousands of West Texas wells with no pipeline connections. They have been one of the main factors in Texas' refusal to raise allowables across the board.

Also up for investigation would be the high rate of imports from the Caribbean. Domestic producers say this oil should be moving to Europe instead of to the U. S.

About "hot oil" . . . The Interior Department at least has come up with one answer: Suspension of the Connally Hot Oil Act would not remedy the current production problem.

The department rejected a demand to lift the controls over movement of oil produced in excess of state allowables. The proposal was offered by Paul Hadlick, counsel for the National Oil Marketers Association. He made the suggestion in a letter to President Eisenhower last month.

Acting Secretary Fred G. Aandahl said a study failed to show any shortage of oil. He said if Hadlick has any information to the contrary he will be glad to receive it.

The N.O.M.A. said that lifting the Connally Act would increase production of crude, eliminate the need for a price increase, and assure supplies for both domestic use and for Europe.

What about Texas? . . . First big move to meet Wormser's plea is up to the Texas Railroad Commission.

The industry felt Wormser had Texas in mind in making his statement. That state is the only major oil-producing state with a large production potential still untapped. The other major producing states either are believed near their potential or restricted by transportation bottlenecks.

But Texas has some slack left in its production—and quite a bit of it. The commission and producers agree the state could produce and move oil resulting from a 16-day schedule in February. It might even handle a 17-day pattern. This means Texas could produce and transport at least 170,000 bbl. more oil daily and probably 340,000 bbl. more this month than planned.

At least whatever oil was left over on the 17-day schedule could go to storage. The crude inventories now generally are at or below the desirable levels.

It could be done . . . What's more, the commission has the power to increase allowables by any amount it wishes, at any time it wishes.

This increase can be done in one of two ways. The commission can:

. . . Issue an emergency order. It could do this without holding a hearing. But the order could remain in effect only 15 days. The commission would have to call a hearing before the time elapsed to reaffirm the order.

. . . Amend the original order without a hearing, provided it acted on evidence already considered at the last regular monthly hearing.

What are chances . . . Whether the Railroad Commission will act on Wormser's appeal is anyone's guess. Sources close to the commission think it probably will not.

The decision would not have to be unanimous. Two of the three members could order the increase. Indications are, though, that the necessary two aren't yet convinced that a sufficient emergency exists.

The commission has tried to act as a stabilizing influence in a period of abnormal demand. It is worried by:

. . . Excess gasoline stocks.

. . . Nation-wide lack of pipeline transport.

. . . Unconnected-well problem in Texas.

Commissioners also are concerned about what will happen to the domestic industry when the Suez-inspired European oil shortage ends. It is afraid that problems of Texas producers will be many times worse. Especially would this be true if all the production stops are pulled before the problems are eased.

Because of these factors, Texans predict it will take a stronger and more direct appeal from Washington to get more oil out of Texas.

Other allowables up . . . Meanwhile, Oklahoma and Louisiana conservation

Import Strategy Being Mapped

WASHINGTON. — Top government officials are studying a ticklish oil problem: How to tell importers to keep their future imports at the 1954 level.

Mobilization Director Arthur S. Flemming set off the study last week. He put this question before the cabinet fuels committee: Should the Government put out a statement of the import policy to be followed when the Suez Canal is reopened?

Flemming's action came after talks with domestic producers. They argued the Government should act to prevent, rather than correct, a new flood of Middle East oil.

Flemming agreed it would be a good thing and fair to the industry to make clear just what the Government's policy will be.

The producers maintained Flemming should call on importers to file estimates of future entries. If these don't comply with the cabinet committee formula, they said he should certify to the President that imports threaten national security.

Middle East oil is still coming into this country at a rate of more than 80,000 bbl. daily. Venezuelan oil imports remain high, despite the effort to divert as much Caribbean oil as possible to Europe.

The ODM is looking into this situation—both from the standpoint of imports and the European lift.

A swan song . . . Any statement on imports issued by Flemming is expected to be his last word.

He is due to resign his government post soon. He wants to return to the presidency of Oberlin College.

But the importers will have some weeks in which to work out a new pattern for distribution of Middle East oil, an ODM official said. Political questions are seen as more troublesome than the engineering problems of clearing the Suez Canal or repairing damaged pipeline.

If there were no political bars, the canal could be restored to use in a couple of months. But Russia is persuading Egypt's Colonel Nasser to drag his feet, they said. The communists also are working in Syria to hold up repair of the Iraq pipeline.

authorities increased February allowables for those states. Kansas retained its February allowable at the January figure.

Oklahoma's Corporation Commission jumped the allowable 10,000 bbl. daily to 630,000 bbl. daily. It raised the minimum allowable per well from 25 to 28 bbl. It also adopted a new depth-bracket formula designed to give greater production to wells below 4,600 ft.

Louisiana increased its February allowable 3,427 bbl. daily to 982,453 bbl. daily, an all-time high. Basic allowable formula was left unchanged. Increased production was allocated to new wells.

Kansas retained its allowable at the January figure of 350,000 bbl. daily. Officials reported that operators had yet to match that production mark and there was little need to increase it.

Probers tee off . . . The first of several probes of the MEEC will be opened this week by Sen. Joseph C. O'Mahoney of Wyoming.

A joint antitrust and public lands subcommittee will start hearings February 5 on what O'Mahoney calls the "unsuccessful" crisis program.

The Senate commerce committee, under Sen. Warren Magnuson of Washington, also is planning an inquiry. The Senate rules committee last week approved $50,000 for a probe into prices. It will cover the whole marketing field from the price standpoint. The inquiry is expected to touch the Middle East problem in tracing the sequence of the industry's pricing actions.

Similar studies are planned also by House committees. At least one is expected to go through.

All of the investigations will cover the recent price increases as well as the European problem. But price alone is the subject of one move for a special inquiry. Twenty senators, headed by Sen. W. Kerr Scott of North Carolina, plan to set up a special committee to look into the industry's entire price structure.

The recent gasoline increases, Scott charged, "strongly indicate the possibility that the large oil companies are taking advantage of the public."

Sen. John O. Pastore of Rhode Island figured the raises will mean a "staggering" $1.15 billions a year to motorists. Another senator, Pat McNamara of Michigan, called them a "classic example of price gouging."

O'Mahoney will call both government and industry men as witnesses. Interior Secretary Fred A. Seaton, Mobilization Director Arthur S. Flemming, trade-association officers, and major company executives are on his list.

NEW APPROACH to handling information will be directed by Charles E. Starr, Jr., as . . .

Jersey Speeds Flow of Technical Data

NEW YORK.—Standard Oil Co. (N. J.) will try a new way to sift and channel the growing load of technical data.

Esso Research & Engineering Co., a Jersey subsidiary, will operate a new technical information division. It is designed to conserve technical manpower and speed scientific work in the big Jersey family.

The new clearing house will gather, evaluate, and rechannel technical information for all Jersey affiliates throughout the world.

The new approach will do even more. It will tie in with Jersey's public information program.

Heading up both phases of the operation is Charles E. Starr, Jr., formerly an assistant director of research, and until recently public relations manager for Esso Research.

William M. Craig will take over the latter post, and William T. Knox, an assistant research director, has been named manager of the new division. His assistant is Gordon Duncan, former assistant manager of the office of scientific liaison.

Why the new approach . . . The new division has been on the planning boards for a long time. Something was needed to attack the problem of handling the growing load of technical data.

In the U. S., the volume of technical literature has roughly doubled every 5 years. At Esso Research alone, more than 1,000 technical reports were written during 1956.

Deepest Well Plugs Back, But Still Champ

NEW ORLEANS.—Sand trouble has caused Richardson & Bass to back up the hole in the world's deepest well. Although 720 ft. shallower, it's still the world's deepest producer.

The 1 L.L.&E.-Humble "L" State Lease 2414 in Plaquemines Parish south of here is now flowing 270 bbl. of oil daily at 20,741-45 ft. Tubing-head pressure is 9,000 psi. against 8/64-in. choke.

The well was originally completed at 21,443-65 ft., but sand trouble made production impossible from that formation.

After lengthy workover and recompletion attempts, the shallower sand was perforated and began flowing January 3. Flow is holding steady.

Casing-head pressure is constant at 11,400 psi. There is no packer in the well. Shut-in tubing pressure is 10,400 psi.; gas-oil ratio is steady at 2,100 cu. ft. per bbl.; and water cut is about 70 per cent with no indications of increase. Based on test data, bottom-hole pressure is probably around 17,500 psi.—the world's greatest.

Offset sidetracked . . . Richardson & Bass is sidetracking an offset to the world's record-breaker.

The 1 Humble-R. F. Price et al. was drilling below 19,000 ft. when 5,000 ft. of drill pipe was lost in the hole. The operator was cutting a window in the casing at 11,887 ft., preparing to resume drilling.

Drilling Prices Down

Mills says increase needed to offset still-rising costs

DALLAS.—The oil industry was put on notice last week to expect contract-drilling footage prices to rise in 1957. The increase would offset rising costs to contract drillers.

That's the opinion of Brad Mills, executive vice president of the American Association of Oilwell Drilling Contractors. He expressed the opinion in a statistical report on 1956 drilling operations.

Mills said the weighted average contract cost for 1956 was $4.75 a foot. It was $4.90 in 1955 and $5.85 in 1952, a 21-year high. He said, however, the $4.75 price represented only 34 per cent of the total cost of drilling. That cost was $13.75 a foot. In 1944 the contract cost was 57 per cent of the total, which includes cost of materials and services bought directly by the oil operator.

Mills concluded that contract footage prices actually have fallen in the face of greatly increased costs to the contractor. He added:

"It is strongly indicated that drilling costs will increase during 1957. And it is only reasonable to assume that contract footage prices will be advanced to absorb this rise."

Drilling contractors, meanwhile, showed these achievements during the year:

. . . Increased rate of penetration. This is up 92 per cent since 1941.

. . . Drilled 58,281 new wells in the U. S., up 1,421 over 1955. Total footage was 234,350,550, with the average well depth at 4,022 ft.

. . . Cut average contract cost from $4.90 a foot to $4.75. Total cost of drilling meanwhile moved up from $12 to $13.75 per foot.

. . . Drilled 93 per cent of all U. S. wells, a total of 45,192 and 217,946,012 ft. of hole.

. . . Averaged running 2,846 rotary rigs during the year, 27 short of the 1955 figure.

Nebraska Studies Oil Law

LINCOLN.—The Nebraska Legislature is considering a bill calling for creation of a state oil and gas conservation commission.

A similar measure was killed by the unicameral legislature 2 years ago.

The new bill calls for a five-member commission, four to be appointed by the governor and the fifth to be the director of the State Geological Survey. A petroleum engineer would be employed as director of the setup.

watching WASHINGTON

. . . with Bertram F. Linz

A dam for imports? . . .

THE Government will be urged this month to lock the oil-import stable before the horse gets away again.

Mobilization Director Arthur S. Flemming is due to resign within a few weeks. His swan song will be a suggestion that the administration act to control imports to prevent a flood when the Suez Canal is reopened.

The Middle East crisis last November was the only thing that kept Flemming from reporting that imports threatened national defense. Such a report would have started the wheels moving under the national security clause of the trade agreements law.

When the Suez Canal closed Flemming held up his report. But he said he would study the importers' programs again when the canal reopened. If they showed that imports again would be excessive, he indicated, he would take action.

Domestic producers are confident that Flemming will issue a strong statement before he quits Washington. The canal closing deprived Europe of its main source of oil. But it also raised the need for shifts of supply in this country to keep Atlantic Coast refineries going. The importers say that alone will make the Government more ready to impose controls if the importers don't scale their programs down.

Insurance going abroad . . .

THE Government is going back into the war-risk insurance business again. This does not indicate any new fear of war, however. Officials say it has been under study for a number of years. The additional guarantee against losses to American investors abroad was made possible by a bill approved last July.

The International Cooperation Administration has been guaranteeing Americans against losses abroad due to expropriation or inability to convert earnings into dollars. Now it is preparing to offer insurance against losses from war damage.

The new insurance will protect against loss from damage or destruction of physical plant, equipment, and facilities as a result of war or enemy attack. It will not cover losses from civil war, revolution, rebellion or other civil strife. Only the actual American investment in the plant will be covered, and to a maximum of 90 per cent.

War-risk insurance will be issued only on plants in countries whose governments have entered into agreement with the U. S.

The ICA has done a considerable business in insuring against expropriation and inconvertability. A number of oil companies operating abroad have availed themselves of these guarantees.

Man the pumps . . .

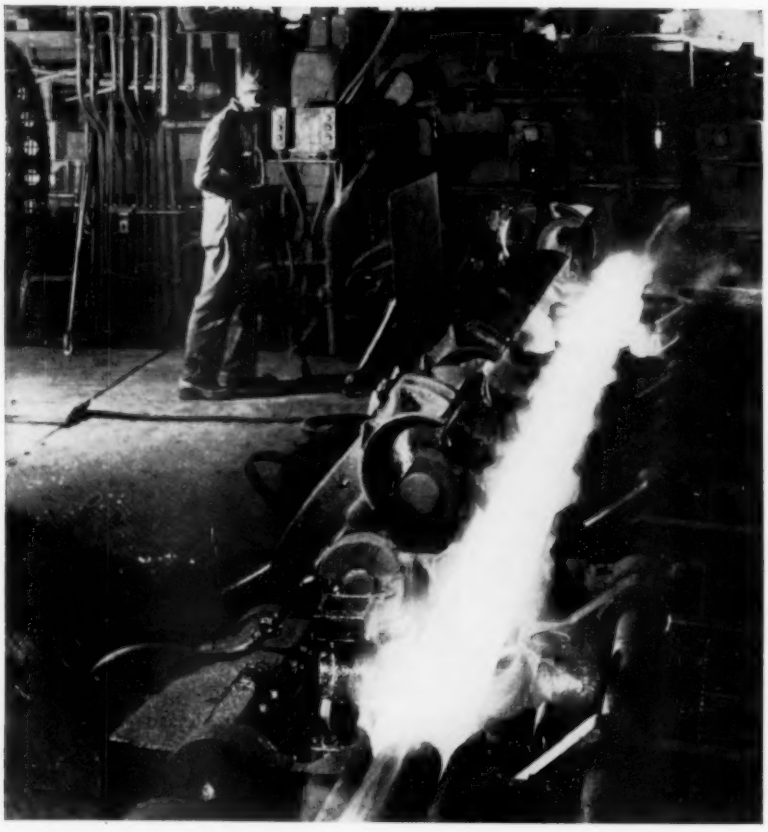
A WATER-FLOOD project will be set up in Elk Hills to stop the loss of several million barrels of oil a year by leakage.

The Navy Department reported several years ago that oil was moving out of the Elk Hills reserve. The first effort to save the oil was made by increasing production. This, however, didn't halt the movement.

The Navy has advised Congress of a plan for Standard Oil Co. of California to drill two water-injection wells on the south end of the reserve. The water would be provided from the disposal system to the north. If the plan works, it will be possible to halve the present production of about 14,000 bbl. daily.

The House armed services committee already has approved the plan. The Senate committee is expected to act shortly. If the Justice Department finds no flaws in it, the way will be cleared to start the project.

Elk Hills is the only reserve still under full government control. The other producing reserves were farmed out to private operators years ago.



What's Ahead in Drilling

- 77,000 wells by 1970
- More deep wildcats
- Big offshore play
- Cost-saving equipment

When a steel company sizes up its needs for future expansion, it has to know what it's customers will require.

Here's what United States Steel Corp. thinks should be expected in the drilling industry for the next 14 years.

The article, appearing exclusively in The Oil and Gas Journal, was prepared by Fred T. Haner, director of market economics for U. S. Steel.

TUBULAR GOODS to the tune of 4,200,000 tons a year will be required by 1970—despite refinements in slim-hole drilling.

How U. S. Steel Views a Big Customer

THE postwar era has seen the greatest acceleration of drilling activity since the early days of the petroleum industry.

Footage has tripled since 1944[1] and reserves have grown 50 per cent.[2] Daily demands have grown over 3.5 million barrels,[2] but today's surpluses indicate that most of the output of wells now being completed will be used to meet increasing future consumption rather than current demand.

The industry has been drilling as if there were great shortages of petroleum products. Some suppliers of equipment and materials, even a few of the oil companies, have voiced concern that the pace cannot continue. They feel at some point there may be a return to the level of oil-field activity needed to supply consumers over the short run; or, without a substantial rise in the price of crude, the terrific momentum of the race for reserves may at least diminsh.

The analysts expressing this anxiety cite the fact that many of the smaller companies are not financially able to sink a hole now and wait for an income from the well which is spread out over many years. They point out that costs are prohibitive and leases are being bid higher and higher each year. Gradual depletion of pools closer to the surface forces deeper exploration and development, and this added depth compounds the usual expense of drilling a well.

These factors, as they will influence oil field capacity, are important to the consideration of facility expansion by suppliers of the petroleum industry. New steel mills, and new plants producing drilling equipment and materials, require expanding markets for their products. A review of the underlying factors gives strong assurance that the tempo of activity will not subside; that it will, in fact, continue to accelerate at the unprecedented rate we have witnessed since the turn of the decade.

Six reasons provide strong incentives for the oil companies to drill increasing numbers of wells which will require a greater volume of new equipment and materials:

. . . Activity in the oil field today is directed toward meeting demand in the years ahead rather than in 1957.

Individual companies realize that they could be replaced as leaders in the industry unless they prove up sizable reserves before competitors do. This race for a stake in the future has influenced oil firms to boost drilling programs to physical and financial limits.

U. S. Drilling Trend Through 1970 Is Upward

	1955	1956	1957[4]	1970[5]
New Wells completed	56,682	58,160	62,000	77,000
Total footage (million feet)	226.3	233.9	253.0	350.0
Average depth (feet)	3,992	4,022	4,080	4,500
Wildcats	12,271	13,034	13,850	21,200
Per cent of total wells	21.6	22.4	22.5	27.5
Average depth (feet)	4,825	4,759	4,860	5,250

. . . The expense of labor, material, and working capital have combined to nearly double costs since 1950.[2]

A company will definitely incur greater expense next year if it waits to drill a well with the same subsurface conditions.

There can be no doubt that the price of crude will begin to rise as demand approaches supply in the years ahead; however, the profit margin between mounting costs and return per barrel cannot help but narrow in the near future. Thus it becomes financially desirable to prove up the greatest volume of reserves as soon as possible.

. . . Experience has proven that the most prudent company action is the acquisition and testing of the best available leases as quickly as funds and equipment will permit before a competitor does the same.

This facilitates organized marketing and systematic growth of future production. Gradual depletion of older fields means the construction of new pipelines and the installation of other production equipment.

Long-range planning avoids unnecessary expenditures, and increasing numbers of wells must be drilled to provide information and circumvent the retention of uneconomic leases.

. . . Another important reason that drilling has, and will, set records every year is technological improvement. The following figures show the great progress that has been made in improving penetration rates, and counteracting in part the costs previously mentioned.

	Average No. of active rigs[3]	Footage drilled 000 omitted[3]	Wells completed[3]
1940	4,193	91,467	30,040
1945	4,387	93,240	26,879
1950	4,517	159,288	43,279
1955	4,867	226,270	56,682
Per cent gain 1940-55	16	147	89

Increased physical capacities of equipment, better muds, superior oil country tubular goods, and improved techniques in their use have enabled the industry to explore and develop the leases they have acquired at an increasingly faster rate.

. . . Some of the capital necessary for the petroleum industry, in general, and especially for the smaller companies, to take the tremendous and multiplying risks of sinking a well, may be provided by the election of writing off intangible drilling expense.

. . . National security, beyond the company point of view, is another major consideration for at least the continuance of the present trend of oil field activity.

Despite the various advantages of foreign exploration it is absolutely necessary that sufficient reserves be available within the United States.

Realizing its responsibility as a principal source of energy and coordinating through the A.P.I., the petroleum industry has cooperated with the Department of Defense in maintaining a proper reserve-consumption ratio.

The forecast . . . These considerations will bear greater influence on future drilling activity than will complications in the supply-demand picture.

Their net effect on the outlook indicates that 77,000 wells[4] will be drilled annually by 1970, with a gradually increasing proportion of exploratory tests. The average depth per well will increase with (a) the added number and depth of wildcats, (b) increased offshore dirlling, and (c) generally deeper producing strata. The result is at least 350 million feet of hole per year as we enter the 1970's.[4]

The future should be regarded optimistically by the suppliers of the industry as well as by operating companies. New equipment for (1) deeper drilling, (2) the reduction of costs, and (3) improved safety will brighten the future.

Large quantities of oil country tubular goods, probably exceeding 4.2 million tons, will be required annually by 1970,[4] despite engineering innovations, and refinement of slim-hole drilling techniques.

Expansion in almost every phase of the oil and gas equipment industry will be necessary to meet customer requirements. Only with the aid of these additional facilities will the petroleum companies be able to produce in sufficient quantities to fulfill demand for gas and liquid hydrocarbons.

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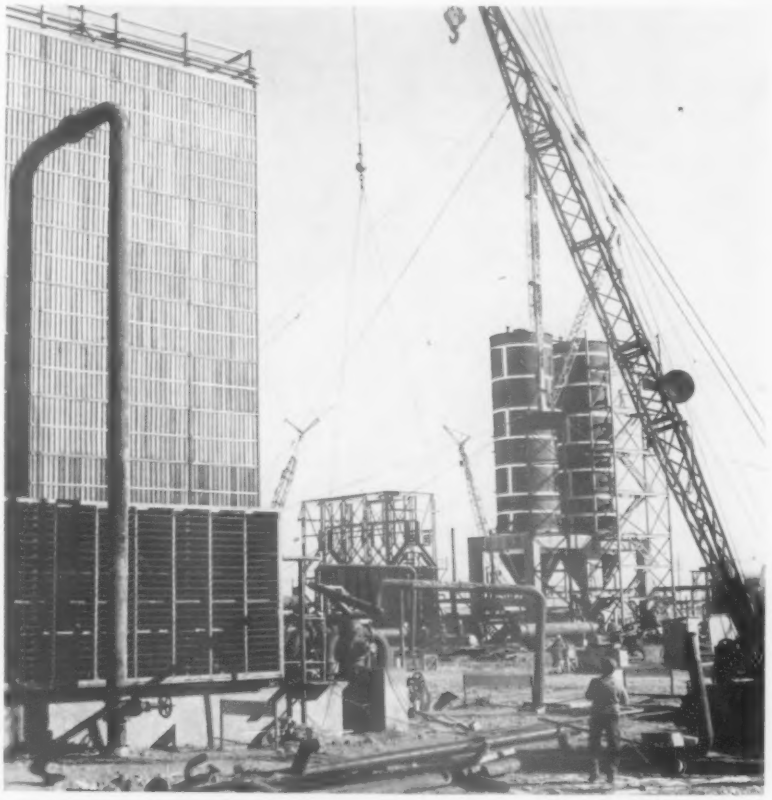


Gilsonite Getting Ready: Gasoline and coke will begin moving from this plant next summer. The products will be derived commercially for the first time from the black mineral, gilsonite. American Gilsonite Co., owned jointly by Barber Oil Co. and Standard Oil Co. of California, is putting $12,000,000 into the processing plant, located near Grand Valley, Colo. A 70-mile pipeline which will carry gilsonite in a slurry from mines at Bonanza, Utah, already has been finished by Engineers, Ltd., Pipeline Co. Capacity of the plant will be 265 tons of coke and 1,300 bbl. of gasoline daily.

Gas Line Bid Revised

Quick FPC green-light seen for 1,517-mile Texas-Florida system; work slated this spring, finish by summer of '58

WASHINGTON.—A pipeline system to bring natural gas from just north of the Mexican border around the Gulf Coast to new markets in Florida was near approval last week.

The two firms planning the project have changed contract features to which the Federal Power Commission had objected. Houston Texas Gas & Oil Corp. and Coastal Transmission Corp. filed their revised bid with the FPC a week ahead of the deadline.

F. E. Stanley, president of Houston, said he expected the FPC to grant the certificate either late last week or sometime this week.

Barring surprise hitches, the line could be started this spring and completed the summer of 1958. It will move 250,000,000 cu. ft. daily at first. But the growing Florida market points to a rapid increase in the volume of gas flowing through the line *(The Oil and Gas Journal, November 12, 1956, page 138)*.

The system will include 1,517 miles of main line running from McAllen, Tex., to south of Miami (see map). It will cost $148,874,000.

Contract revisions . . . When the FPC authorized the project December 28, it required Houston to:

. . . Make each class of service bear its proper share of the costs, based on a 6 per cent rate of return.

. . . Remove the cancellation and reduction-in-take provisions in the contracts with Florida Power Corp. and Florida Power & Light Co.

. . . Alter its minimum bill terms.

. . . Remove cancellation provisions on primary interruptible service.

The four major suppliers—Magnolia Petroleum Co., Sun Oil Co., La Gloria Oil & Gas Co., and Pure Oil Co.—agreed to lower prices. This will cut cost of the gas over $1,000,000 a year. The power companies, which will take 150,000,000 cu. ft. daily, waived the clauses in their contracts as required by the FPC.

"The generous action of these natural-gas producers," Stanley said, "reflected their interest in Florida development, and prompt cooperation of the major utility companies who will use the gas to generate electricity practically assure success of this effort in behalf of all Florida fuel users."

One minor change requested by the FPC was not made. But Stanley said the principle involved had already been accepted before and would not stand in the way of approval.

Construction . . . Coastal will tap 42 fields in Texas and Louisiana with 414 miles of supply lines. Its 574-mile, 24-in. main line will transport the gas from Hidalgo County, Texas, on the Mexican border, to Houston's system at Baton Rouge. The Coastal system will be powered by four main-line stations with 16,500 hp. Total cost of the line and stations will be $54,589,000.

Houston will build a 943-mile, 24-in. line from Baton Rouge to Dade County, Florida. The main line, plus 682 miles of laterals and four compressor stations of 6,000 hp. each, will cost $94,285,000. The line will serve 34 distributors and 17 plants.

Unique contracts . . . The heart of the project is the user-producer contract which pegs the price of gas to fuel oil.

This applies to gas sold to Flordia Power and Florida Power & Light, which will buy 60 per cent of the entire volume moved by the pipeline at first. The firms buy directly from the producers. The pipeline never owns the gas. It merely transports it for a fee.

The price paid by the power companies will vary with the price of fuel oil, which now fires their boilers. It will always be below fuel oil by a fixed amount — enough to make it worth the utilities' while to switch to gas. This contract—which may set the pattern for many in the future—enabled Houston and Coastal to line up a big industrial load. And this is the key to a pipeline project serving a state with a climate as mild as Florida's.

Florida Power & Light paid 18½ cents per M.c.f. for gas bought in Texas. Florida Power Corp. paid 21½ cents in Louisiana. Producers will receive 16 to over 18 cents an M.c.f. for gas bought by the pipeline for resale to Florida space-heating customers.

Expansion ahead . . . Ten years ago Florida was considered dead as a gas market. A few pipeline projects were studied and dropped.

But its rapid postwar growth in industry and population changed that picture. Backers of the line say the 250,000,000 cu. ft. daily won't be enough to meet even initial demand. Existing customers, they say, could take more than 400,000,000 cu. ft. daily. So plans to expand are being made before the line is started. Capacity could be raised to 415,000,000 cu. ft. daily by adding 36,000 hp. in compression.

Yakutat Test Ready to Start

DENVER.—Movement of equipment and men to the Yakutat region of Alaska is on schedule and work is expected to start this week on an important wildcat for Colorado Oil & Gas Corp. and Frankfort Oil Co. *(The Oil and Gas Journal, January 28, page 122)*.

Unloading equipment at Yakutat started last week. Drilling crews arrived a day later. Barring bad weather work will start at the well site this week. The wildcat will test a 1,100,000-acre concession held by the two firms along Yakutat Bay and the Gulf of Alaska.

Refinery Contracted

40,000-bbl. Texaco plant will be built at Anacortes

NEW YORK.—Construction will start March 1 on another refinery in the Pacific Northwest.

The Texas Co. has let a general construction contract to Bechtel Corp. for a 40,000-bbl. refinery on the Olympic Peninsula about 3 miles east of Anacortes. When it and other refinery projects under way or planned are completed, refining capacity in the area will approach 250,000 bbl. daily. Texaco's plant is slated for completion in January 1959.

This will be Texaco's second West Coast plant and its twelfth in the nation. It will produce motor gasolines, jet fuels, diesel, furnace and heavy fuel oils, and L.P.G.

In addition to a two-stage crude unit, the refinery will include an 18,000-bbl. Model III fluid cat cracker, a 7,000-bbl. U.O.P. Platformer, cat polymerization unit, sulfuric acid alkylation facilities, plus a hydrogen treating unit using Texaco's hydrotreating process.

A dock capable of handling two tankers at a time plus tankage, utilities and other service facilities will round out the new refinery. Crude will be delivered to the plant by either tanker or from Trans Mountain Oil Pipe Line Co.'s line from Canada.

Texaco picked the 760-acre site for the Puget Sound works from a number in the Pacific Northwest area. The refinery will employ 400 workers.

The Puget Sound refinery will relieve Texaco's 60,000-bbl. Los Angeles works, which has been capable of supplying the West Coast market in the past.

Kermac to Expand Research

DENVER.—Kerr-McGee Oil Industries, Inc., has purchased a tract of land adjacent to its research laboratory in the Denver suburbs for future expansion.

Kerr-McGee officials in Oklahoma City said plans for the tract still are indefinite. But Carl E. Berg, executive secretary of Jefferson County Industries in Colorado, said the company planned a new petroleum research laboratory. The land is in Jefferson County west of Arvada.

Berg said the building and equipment will cost more than $1 million. He added that the laboratory will handle government contract work—much of it to be classified. The laboratory is expected to be in operation by late summer or early fall and will be associated with the Colorado School of Mines.

Pipeline briefs

Panhandle Eastern Pipe Line Co. has branched out into another phase of the oil business by the purchase of Century Refining Co., Inc.

The deal, approved by the Panhandle board last week, gives the gas-transmission firm a 6,000-bbl. daily refinery at Shallow Water, Kans. Panhandle is very active in exploration and production. It also manufactures petrochemicals through National Petrochemicals Corp.

The steady growth of the natural-gas industry is pointed up by reports which show operating revenues for the year ending last November to be 14.1 per cent above the previous 12-month period. Revenues totaled $2,105,332,038 for the 36 natural-gas pipelines reporting to the FPC.

Fowler-Tatom Pipeline Contractor, Inc., has the contract for four 38-mile lines being laid from the Esso Standard Oil Co. refinery at Baton Rouge to Sorrento, La., by Interstate Oil Pipe Line Co. The lines—two 4-in., one 6-in., and one 8-in.—will carry ethylene, butane, and propane to salt-dome storage at Sorrento to be used as feed stock in petrochemical plants.

Fourteen miles of the project has been completed, with all four lines being laid in the same ditch. The job is expected to be completed around April 1. German and Italian pipe is being used.

Pacific Northwest Pipeline Corp. plans to increase deliveries to Colorado Interstate Gas Co. by 17,500,000 cu. ft. daily this year. This will involve building $3,129,000 in new pipeline facilities. The plan will be heard by the Federal Power Commission next week.

Ohio Oil Co. has increased capacity of its Martinsville, Ill.-Lima, Ohio, crude system by 20,000 bbl. per day by adding three 2,500-hp. electric pumping units. The system will now be able to move 215,000 to 220,000 bbl. per day.

Two units were installed in a new station at Roachdale, Ind., which was started up last week. Another 2,500-hp. unit was added at the Elwood, Ind., station. The increased capacity will provide room on the common carrier for any influx of crude.

Pembina Pipe Line, Ltd., has another major expansion program planned this year to handle growing output from Pembina field in Alberta. Pembina Pipe Line spent $4½ million last year and built 100 miles of gathering lines. Another 100 miles will be added to the field system this year, plus 32 miles of loop along the 70-mile, 16-in. main line.

Tennessee Gas Transmission Co. has an FPC examiner's approval for permanent authority to add $30 million in new lines to its system. The facilities are located in Kentucky, Louisiana, Tennessee, Mississippi, Massachusetts, Pennsylvania, and Ohio. The ruling of Examiner Glen R. Law will become final if there is no appeal in 30 days.

Trans Mountain Oil Pipe Line Co. transported 47,251,641 bbl. of oil during 1956, or 129,103 bbl. per day. This is 16,598,174 bbl. more than the 1955 volume of 30,653,467 bbl. Deliveries to British Columbia refineries were 59,590 bbl. daily. Washington plants took 52,590 bbl. daily. About 40 per cent of the other 17,023 bbl. daily went to offshore shipments.

Also for Pipeliners . . .

Lack of pipeline capacity to the Gulf Coast and the number of unconnected wells in Texas are worrying the Texas Railroad Commission as U. S. officials put the pressure on for more crude oil to go to Europe (P. 80) . . . A revised bid has been presented to the FPC for a pipeline system to move gas from Texas and Louisiana to Florida (P. 86) . . . Service Pipe Line cements its title as the nation's biggest crude system by acquiring American Oil's lines in Texas and a piece of Rancho line (P. 88) . . . Transcontinental plans a $110-million expansion in 1957 (P. 89) . . . Colorado Interstate is beating the cold wind and blizzard conditions by building "houses" for welding crews (P. 92) . . . A rifle is standard equipment for a welder working on the Elath-Bersheba crude line in Israel (P. 99).

PLUS THESE TECHNICAL FEATURES: Pipeline contractors report to the industry in a 16-page special section: Why they now build virtually all pipelines (P. 105) . . . Who's who in the Pipe Line Contractors Association and the group's functions (P. 108) . . . How the contractor would like to deal with companies and vice versa (P. 109) . . . Why the cheapest bid may not be the best (P. 118) . . . Directory of pipeline contractors (P. 119) . . . and Pipeline Patrol's construction tables (P. 147).

Service System Grows in Texas

TULSA.—Service Pipe Line Co. has absorbed American Oil Pipe Line Co. in the most recent move to consolidate the Standard Oil Co. (Ind.) family.

The merger, effective this month, will boost Service Pipe Line's capacity by 187,000 bbl. daily—pushing the company's total to more than 750,000 bbl. per day. This adds 1,400 miles of line to Service's existing 13,000-mile system making it the largest crude-oil pipeline system in the nation.

In addition, Service has purchased the gathering systems of Yount-Lee Pipe Line Co. near Beaumont, Tex. This includes 37 miles of lines in three gathering systems. Yount-Lee was also an affiliate of Indiana Standard.

Here is what the Service-American merger involves:

. . . **Rancho Pipe Line System.** Service will assume American's interest in the 450-mile 24-in. line. American has been delivering about 50,000 bbl. of oil daily into the system which originates at McCamey, Tex., and extends to the Houston-Texas City area.

. . . **American's East Texas line**, originating north of Longview. The 12-in. line also moves crude to the Gulf Coast.

. . . **American's West Texas line,** starting north of Snyder. This 10-in. carrier connects with Rancho south of San Angelo.

. . . **A 7,000-bbl. Rio Grande** Valley line, which carries Willamar field production in Willacy and Cameron counties to tanker and barge-loading facilities at Port Isabel.

Other Indiana changes . . . The merger is just one of several recent developments among Indiana Standard subsidiaries.

Stanolind Oil Purchasing Co., the largest domestic crude-oil marketing company in the nation, changed its name last week. From now on it will be known as Indiana Oil Purchasing Co.

The firm's primary function is to provide crude to most of the nine refineries shown on the map (above). It also furnishes some 35 other refiners a substantial part of their crude supply.

Indiana Oil is currently purchasing 900,000 bbl. a day in an area extending from Canada to the Gulf Coast, and from Wyoming to Alabama.

Effective this month, Indiana Oil will assume crude oil purchasing and selling activities formerly handled by Pan American Production Co. During 1956, crude purchasing activities of Pan-Am Southern Corp. were absorbed by the firm.

Also effective last week was Stanolind Oil & Gas Co.'s merger with Pan American Production Co. and Pan American Gas Co. Stanolind, the nation's fourth-ranking U. S. producing company, assumed the Pan American Petroleum Corp. name.

Last August, Service Pipe Line acquired 322 miles of crude lines from Pan-Am Southern Corp. These lines are in Arkansas and Louisiana, and constitute Service's entry into these two states.

In addition, Amoco Chemical Corp. was formed to consolidate three chemical companies.

Wildcat Abandoned, But It Might Be New Champ of Open Hole

FILLMORE, Calif.—The Texas Co. has a probable new record for open-hole drilling at a wildcat abandoned near here recently.

The deep Fairview Canyon test had 15,910 ft. of open hole. It went to its scheduled depth of 17,485 ft. with only 1,575 ft. of 11¾-in. casing. No favorable shows were reported. Decision to pull out came after a fishing job on a stuck wire-line tester.

The company used 9⅞-in. bits below the casing and employed plain 78-lb., 50-viscosity, 3-cc. water-loss mud.

Rocky Mountain Drilling Co., the contractor, reported operations were as smooth as if casing had been run all the way. The wildcat was the 1 Lawton, 3 miles east of Fillmore.

Object of the test was the Pliocene producing formation found in the deep Fillmore field 1½ miles west of Fillmore.

Alberta Production Dips

CALGARY.—Alberta crude-oil production will take its second dip of the year in February. Purchasers have nominated 429,330 bbl. daily for the month. Nominations were 441,631 bbl. daily in January and 447,896 bbl. daily in December.

United States refiners accounted for 89,938 bbl. daily of the February total. Imperial Oil, Ltd., requested another 20,000 bbl. daily for export.

Two major pipelines will handle 350,546 bbl. daily of Alberta crude. Interprovincial Pipeline will carry 190,673 bbl. daily east. Trans Mountain will handle 159,873 bbl. daily for western customers. Imperial again was the

major purchaser with a request for 159,250 bbl. daily.

U. S. buyers and their nominations were: Shell, Anacortes, 38,550; General Petroleum, Ferndale, 33,933; International Refineries, Wrenshall, Minn., 10,700; Bay Refining, Bay City, Mich., 5,000; Dow Chemical, Midland, Mich., 700; West Branch Refineries, West Branch, Mich., 700; Union Oil, Cut Bank, Mont., 255; Phillips Petroleum, Great Falls, Mont., 100.

Transco Expanding

Firm earmarks $110 million for more capacity, storage

DALLAS. — Construction costing about $110,000,000 is planned this year by Transcontinental Gas Pipe Line Corp.

Tom P. Walker, president, said the expansion will add 215 million cubic feet to the company's daily pipeline capacity. It will bring Transco's total daily capacity to 970 million cubic feet, exclusive of storage gas, he said.

Plans for the expansion program were revealed by Walker in a talk before the Dallas Association of Investment Analysts.

He said a Transco subsidiary, Transcontinental Production Co., is spending about $2,000,000 on additional storage facilities in the Pocono-Catskill regions of New York and Pennsylvania. The new storage, located near the company's principal markets, will make more gas available to meet peak requirements in severely cold weather.

Present storage in the Oakford, Pa., field provides capacity of 12 billion cubic feet each year. A maximum of 136 million cubic feet per day can be delivered from this field.

El Paso Buys Tekoil Stock

DALLAS.—Tekoil Corp. is selling 200,000 shares of common stock to El Paso Natural Gas Products Co., a wholly owned subsidiary of El Paso Natural Gas. Co. El Paso Products has an option to purchase an additional 150,000 shares over the next 3 years.

Tekoil has also obtained a long-term bank loan to consolidate indebtedness. The two moves are expected to result in a stepped-up development program and expansion of Tekoil's water-flood programs under way in Lehn-Apco and Malicky fields of West Texas and in East Centerville field of Illinois.

Tekoil was organized in 1950 as Davison & Co. in Robinson, Ill. It is an oil and gas engineering and producing company specializing in secondary recovery, principally by water flooding.

Big Barge Planned

New offshore firm to build unit similar to Kermac's 46

HOUSTON.—The recently organized Brewster-Bartle Offshore Co. will build a big drilling barge similar to Kerr-McGee Oil Industries' monstrous Rig. 46.

Brewster-Bartle Offshore was formed in January by two leading tideland drilling companies, Brewster-Bartle Drilling Co., Inc., and Kerr-McGee. John Domercq, Jr., Houston, executive vice president of Brewster-Bartle, is president of the new firm.

The drilling unit, designed for operations in 70 ft. of water, will cost about $3,500,000 fully equipped. Completion is slated by the end of the year.

Plans call for a unit designed after Kermac Rig 46 completed last fall *(The Oil and Gas Journal, October 29, 1956, page 64)*. This barge, which introduced a new principle in the design of offshore equipment, has four bottle-shaped stabilizing columns tied in with a grid of cylindrical members.

Brewster-Bartle Offshore plans to use the new barge in drilling either on contract or for its own account.

Each of the parent companies paid $50,000 for 25,000 shares of stock in the new company. Plans call for additional investment of at least $630,000 each. Also, Brewster-Bartle Offshore has a commitment for a bank loan of $2,250,000 to be secured by a mortgage on the new rig.

Deep Wildcat In Trouble

AMARILLO.—The deepest hole ever drilled in the Texas Panhandle is in trouble.

Magnolia Petroleum Co. is fishing for more than 5,000-ft. of 5½-in. casing in its 1 D. D. Feldman in Hemphill County. Casing parted while being run to total depth of 15,997 ft. in preparation for production tests. Top of the fish is at 10,744 ft. Operator had made no progress in recovering it at midweek.

The wildcat is about 10 miles east of Glazier in the northeast corner of Hemphill County. It is about 40 miles east of nearest production.

Magnolia plans to run production tests of three zones indicating gas production. These are at 7,562-7,608 ft., 9,045-9,150 ft., and at 11,433-11,531 ft.

The 1 Feldman is more than 1,700 ft. deeper than the former Texas Panhandle record holder. This was Gulf Oil Corp.'s 1 E. Porter-A in Lipscomb County, which was abandoned dry in the Ellenburger at 14,278 ft. in 1949.

——*Industry* briefs

Magna Oil Corp. stockholders voted in Dallas last week to merge the company with Johnson Ranch Royalty Co., Inc. The merger previously was approved by Johnson Ranch stockholders. Magna will be the surviving company.

A bill to increase North Dakota's oil and gas gross production tax from 4¼ per cent to 5½ per cent has been drafted for introduction to the North Dakota Legislature. The additional tax would bring in an estimated $400,000 a year.

Republican Gov. John Davis, in his message to the legislature, urged caution in passing any bills affecting the oil industry. He said "any proposal to increase taxes . . . should be moderate."

Vanalta, Ltd., of Vancouver has taken over most of the assets and holdings of Millmak Co., Ltd., operator in the Eureka and Lloydminster oil areas. The deal involved transfer of Vanalta treasury stock.

Two independent Calgary oil companies, Henderson Oil Holdings and Select Oil, Ltd., have completed a management agreement with Medallion Petroleums, Ltd., Calgary. Medallion under the agreement takes over complete operations of the two companies.

Oil companies paid bonuses of $16,268,918 into Alberta's treasury at a sale of oil and gas leases on 61 tracts this month. Thirty-four parcels in proved fields of Pembina, Bentley, Fenn-Big Valley, Joarcam, Joffre, and Sturgeon Lake south brought $11,005,380. Six parcels in the Alhambra, Cynthia, and Clear Hills provincial reserves returned $4,017,560. Some 21 parcels of wildcat land brought bids of $1,245,978. Pembina field led all other single areas, bringing $8,118,000 for 23 tracts.

Oil Centennial Corp., a nonprofit organization, has been chartered in Pennsylvania to commemorate the 100th anniversary of the industry in 1959. The organization will accept donations to promote celebration activities. The petition for charter was presented by 16 oil men in Oil City, Titusville, Warren, and Bradford.

The Wyoming Legislature is considering a bill which would impose a 2½ per cent gross production tax on oil, natural gas, uranium, coal and other minerals.

Octanes Climb Again

● First 100-plus premium shows in an Ethyl survey; both grades up one-tenth

THE octane race has started 1957 on the upswing.

One-hundred-plus octane gasoline made its first appearance on the Ethyl Corp. monthly survey last month and 99-plus showed up much more often. National weighted averages for both premium and regular grades move up one-tenth of a number.

In sampling gasoline sold in 53 cities, the report showed one supplier was retailing 100.2 octane gasoline in Houston and 100.8 in Baltimore. Octane ratings of 99 or over were reported in 31 cities last month compared with 22 in December and 12 in November. One 99-plus brand appeared in 14 cities, another in 11.

Range narrows . . . Tightening of the spread between extremes was notable in January report. Except for four cities, all in the high-altitude area of the Rocky Mountains, the January premium averages were within a range of 2.3 octane numbers—96.1 to 98.4. A year ago the spread was from 93.1 to 97.5.

Eleven cities had 98 octane and above averages in January against eight in December and none in January 1956. Baltimore was high with 98.4.

PREMIUM
(Cities per octane group)

Group—	Jan. 1957	Dec. 1956	Jan. 1956
91-91.9	0	0	1
92-92.9	0	0	0
93-93.9	0	1	5
94-94.9	4	3	7
95-95.9	0	0	14
96-96.9	17	18	14
97-97.9	21	23	12
98-98.9	11	8	0
Total cities	53	53	53
Wtd. avg. RON	97.4	97.3	96.2
Wtd. avg. TEL, ml./gal.	2.47	2.50	2.48

REGULAR
(Cities per octane group)

Group—	Jan. 1957	Dec. 1956	Jan. 1956
82-82.9	0	0	1
83-83.9	1	1	0
84-84.9	0	0	1
85-85.9	1	1	3
86-86.9	6	6	14
87-87.9	5	5	3
88-88.9	7	6	8
89-89.9	13	15	10
90-90.9	3	1	7
91-91.9	8	9	6
92-92.9	9	9	0
Total cities	53	53	53
Wtd. avg. RON	90.5	90.4	89.2
Wtd. avg. TEL, ml./gal.	1.97	2.18	2.19

Processing briefs

Explosion and fire in a 5,000-bbl. sulfuric alkylation unit at the Whiting, Ind., refinery of Standard Oil Co. (Ind.), injured seven workers and caused an estimated $1 million damage last week. Cause of the blast, which damaged a small area in the heart of the 220,000-bbl. refinery, was not revealed. Indiana Standard will assume the $1 million loss under its $1 million deductable policy.

The alkylation unit is located not far from the fluid Hydroformer which exploded and burned in August 1955 for a $10 million loss.

Texas Asphalt & Refining Co. has put on stream its asphalt refinery on the Houston Ship Channel. Its capacity is 5,000 bbl. per day. Heavy Boscan crude from Venezuela is mixed with Gulf Coast distillate, yielding 53 per cent asphalt products in the combined charge. Asphalt production amounts to 74 per cent of the 10°-gravity Boscan crude charge alone. The plant was built by Pona Engineers, Inc., Houston.

Humble Oil & Refining Co. turned down a request by the Baytown Employes Federation for a wage increase. The independent union, representing more than 4,000 workers at the Humble refinery, is seeking a 10 per cent wage increase with a minimum of 25 cents per hour.

An $11,000,000 ethylene glycol and ethylene oxide plant will be built at Lake Charles, La., by Calcasieu Chemical Corp. Petroleum Chemicals, Inc., will operate the plant. The latter company will also supply it with raw material from an ethylene plant it is now building nearby.

Using a process licensed by Shell Development Corp., the Calcasieu plant will have an annual capacity of 8,000,000 gal. Lummus Co. is the contractor. Completion is scheduled for early spring. Stockholders of Calcasieu are Cities Service Co., Continental Oil Co., Mineral Solvents Co., and Sears, Roebuck & Co.

Production of polyethylene — and, consequently, demand for ethylene—is on the increase.

Allied Chemical & Dye plans to start production soon of a low pressure polyethylene to supplement its output of the high-pressure type. Texas Eastman Division of Eastman Kodak Co. has raised capacity of its Longview, Tex., plant almost 40 per cent. This plant was increased to 40,000,000 lb. per year in February 1956, and has been increased to 55,000,000 lb.

Denver Research Institute of the University of Denver is completing installation of the radiation source for its tracer lab. When finished, it will offer the first tracer lab service available for research purposes in the Rocky Mountain region. The lab will use a 1,000-curie Cobalt source.

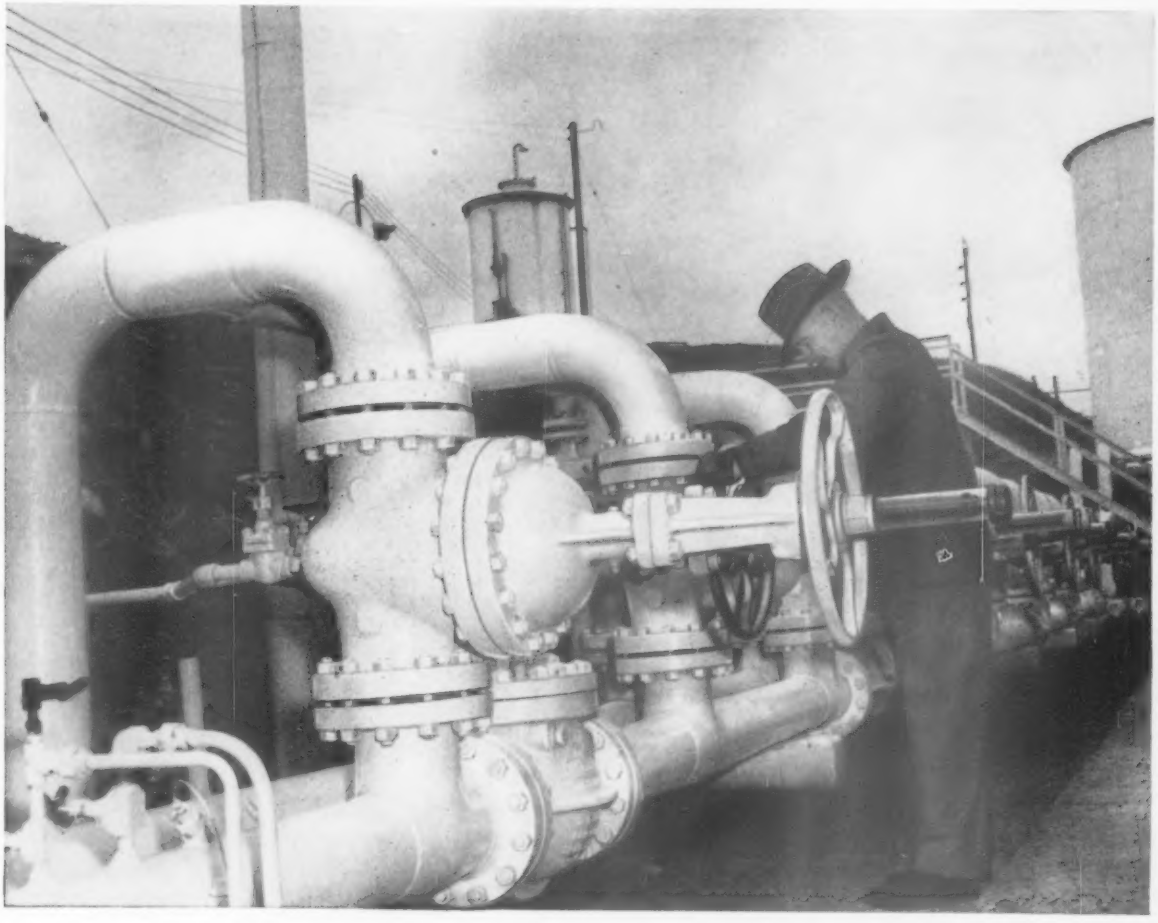
The former research and engineering department of the Ethyl Corp. has been split into two groups. A new engineering department has been formed and the old research and engineering department renamed research and development. The engineering department will be headed by Chief Engineer A. C. Burdick. Dr. George F. Kirby, Jr., will direct the research and development department.

Construction on a 50-ton sulfur recovery plant will start this summer at the Yorktown, Va., refinery of American Oil Co. The unit and accompanying gas treating facilities will be built by Fluor Corp.

Also for Refiners . . .

The Government has threatened to draw on its powers in the Defense Production Act to force refiners to adjust refinery runs to cut down the output of gasoline and step up fuel-oil yields (P. 80) . . . American Gilsonite is moving ahead in building its processing plant at Grand Valley, Colo. (P. 85) . . . Bechtel Corp. has won the contract to build a 40,000-bbl. refinery at Anacortes, Wash., for The Texas Co. (P. 87) . . . The first 100-plus premium showed up in Ethyl surveys during the January check (P. 90) . . . Gulf Oil Corp. has juggled its prices in West Texas, New Mexico, and Venezuela to bring them in line with "most competing purchasers." (P. 99) . . . A T.C.C. unit will be built in Neste OY's refinery in Turku, Finland (P. 99).

PLUS THESE TECHNICAL FEATURES: Radioisotope techniques are being held back by lack of training and information. But there's no need to miss out on this bonanza (P. 121) . . . A summary of current costs in refining construction (P. 124) . . . PETROdatics (P. 135) . . . Equipment design and operation (P. 136) . . . and Refiner's Notebook (P. 140).



How one Crane valve gives double block protection at half the cost

Each of these Crane valves is doing the work of two.

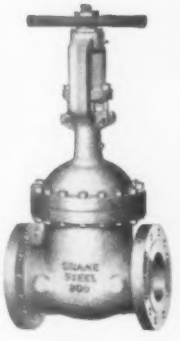
The valves are Crane 61 XU 400-pound steel gates modified with flexible wedge disc. They're installed in the pump manifold at the Borger main pump station of Phillips Pipeline Company's Borger-Chicago products line. This line was looped in 1951 to handle dissimilar products.

The header consists of 13 eight-inch valves, each with a telltale bleeder connection at the bottom. Depending on the product being handled, inlet pressure on the upstream side of a closed valve may be from 20 to 200 psi. Downstream pressure may go as high as 1100 psi. With the bleed valve open to atmosphere, there is *no leakage*.

Double-blocking is accomplished with a *single* valve fitted with a bleed line, cutting installation costs in half. Station personnel have half as many valves to operate. Product contamination is eliminated.

If you have a valve application where double valve, or valve and blind with bleeder, is indicated, why not get the facts on Crane flexible wedge disc gates?

Just ask your local Crane representative or write to the address below.



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PIPE • KITCHENS • PLUMBING • HEATING

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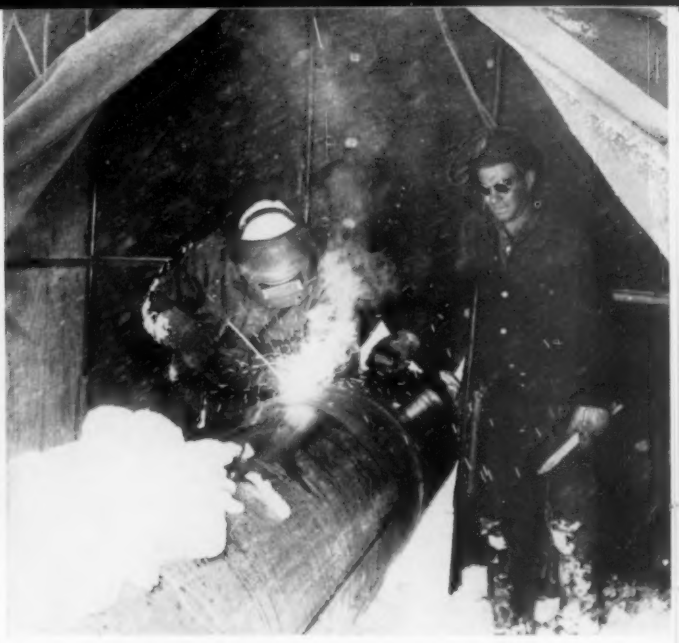


Icy winds and snow freezing out welders . . . So Colorado Interstate put them in "houses."

This odd-looking result permitted completion of a job in winter's worst weather as . . .

Rocky Mountain Line Beats Blizzard

LARAMIE, Wyo. — Colorado Interstate Gas Co. went through on schedule with its 380-mile, 22-in. natural-gas line from Green River, Wyo., to Denver. But it took some real imagination to do it.

Heavy winds and snow were combining to produce ground blizzards which forced welders off the job on the 238-mile final link between Green River and Laramie.

Parker Boggs, assistant superintendent of Colorado Interstate's pipeline department, took a look at the situation and came up with the idea for a welder's hut 8 ft. high and 8 ft. square.

Boggs explained that "once that wind gets over 15 m.p.h., as it often does in southern Wyoming, we would have to halt welding operations. Through use of these huts, the welders were able to continue operations despite winds up to 30 m.p.h."

Twenty-four of the huts were used. Frames of 1-in. angle iron and 1-in. pipe were made by the company. Plyboard was placed on two sides and heavy fireproofed canvas on the other two sides, together with 18-in. overlapping canvas to compensate for irregularities of terrain.

The shelters, which weighed about 250 lb. each, were moved from one location to another by sideboom tractors which hooked onto iron rings at the top of the structures.

Each hut had a 16-in. opening at the top to permit fumes from the welder's electrode to escape.

Boggs said he selected 8-ft. widths so that each welder, working on 22-in. pipe, would have 3 ft. of space in which to work. They were built 8 ft. high to provide sufficient flexibility for the varied terrain.

The entire line was due to go into operation last week. Initial capacity is 100 million cubic feet daily, but a boost to 250 million cubic feet is scheduled later. R. H. Fulton & Co. was the contractor on the final leg.

His job is to protect Parkersburg's reputation

Parkersburg is the first name in the design and manufacture of gas handling and treating vessels. In its Houston plant, 196 different types of vessels are made . . .

. . . and each undergoes rigid checks by ASME inspectors for quality of material and performance.

Parkersburg, where quality and service have gone hand-in-hand for 60 years, is proud of its reputation as the leader in the design and manufacture of gas handling and treating vessels. This position was gained by providing the best engineered and safest equipment in the field, a reputation Parkersburg will go to any end to protect.

Each pressure vessel made by Parkersburg is subjected to inspections that are even more rigid than those required by the code under which it is manufactured. Not only is each vessel checked upon completion for performance in excess of its rated capacities, it is also inspected during fabrication for the quality of materials used. To pass these inspections, made by examiners licensed by the American Society of Mechanical Engineers, each vessel must meet rigid specifications.

That's why if you are looking for quality and performance, you can look to Parkersburg for gas handling and treating vessels. We stake our reputation on our products.

The Parkersburg plant at Houston

ASME Inspectors at Parkersburg

AT PARKERSBURG, QUALITY AND SERVICE
HAVE GONE HAND-IN-HAND FOR 60 YEARS

Parkersburg
RIG AND REEL COMPANY
DIVISION OF PARKERSBURG • AETNA CORPORATION

3345 WINTHROP AVENUE
FORT WORTH 16, TEXAS

Youngstown's "big 5"

HELP SOLVE YOUR OIL OR GAS LINE PROBLEMS, WHEREVER YOU ARE

Here are the "Big 5" reasons why Youngstown Electric Weld Line Pipe is your best buy:

1. It bends readily
2. Wall thickness is uniform
3. Line up characteristics are excellent
4. Weldability is outstanding
5. Long lengths save you time and trouble

It's no secret that installation crews prefer Youngstown Electric Weld Line Pipe for its easy line-up qualities. Good line-up is a direct result of the extra care that goes into its manufacture. To achieve the optimum in roundness, each length of Youngstown Pipe is placed in an hydrostatic expander, here, internal water pressure forces the pipe out against the solid steel walls of the mantle. The diameter of the pipe is thereby increased to a uniformly accurate size. Every length conforms to specifications—ends are truly round, uniform in wall thickness, squarely cut and properly beveled for welding. These excellent line-up characteristics are more evidence that it pays to specify Youngstown Electric Weld line pipe.

Youngstown

ELECTRIC WELD LINE PIPE

QUALITY YOUNGSTOWN SERVICE

THE YOUNGSTOWN SHEET AND TUBE COMPANY *Manufacturers of Carbon, Alloy and Yoloy Steel*

General Offices: - - - Youngstown 1, Ohio.

Suez Chops World Output

● Middle East production tumbles 1,730,770 bbl. daily, pushing world total to lowest ebb in 2 years; Venezuela and U. S. production climb.

NOVEMBER was a dark month in the free-world crude production picture.

An average of 13,683,600 bbl. daily was the lowest in 2 years. This low level resulted from the bottling up of Middle East production when the Suez Canal and Iraq-Mediterranean pipelines were closed.

The shock on the industry will be long remembered. A roundup of data shows just how severe the strain was:

. . . Total free-world output dropped 1,534,200 bbl., a decline of 10.1 per cent.

. . . Outside the United States, free-world production was off even more. It declined 1,707,200 bbl. daily, or 20.7 per cent.

. . . The Middle East was down 1,730,700 bbl. daily. This was a drop of 44.7 per cent in the world's second-ranking producing region.

. . . U. S. output increased some. But a rise of 173,000 bbl. daily to 7,139,000 bbl. daily was not unusual, and was far from being a record.

. . . Venezuela's output reflected most the sudden Middle East tie-up. Its output rose 87,300 bbl. daily to reach a daily average of 2,623,300 bbl. This was the sixth record month in a row.

World-Wide Crude-Oil Production

(Daily average in thousands of barrels)

Country—	Nov. 1956	Oct. 1956	Nov. 1955
Western Hemisphere:			
Argentina	80.7	80.7	80.4
Bolivia	9.0	9.0	7.9
Brazil	25.4	19.6	6.3
Canada	485.0	509.0	410.9
Chile	10.6	10.5	8.5
Colombia	122.1	121.8	113.6
Cuba	1.2	1.6	1.4
Ecuador	9.7	9.7	10.0
Mexico	255.0	255.0	233.1
Peru	53.7	51.3	46.2
Trinidad	84.5	84.1	73.0
Venezuela	2,623.3	2,536.0	2,259.5
Total	3,760.2	3,688.3	3,250.8
W. Europe & Africa:			
Algeria	0.4	0.4	1.0
French Morocco	1.8	1.8	2.0
Egypt	2.0	45.2	36.7
Austria	65.4	65.4	67.7
France	28.6	26.5	21.3
West Germany	70.2	70.2	64.0
Italy	16.5	15.2	5.7
Netherlands	23.1	21.8	19.6
Turkey	6.5	6.5	3.7
United Kingdom	1.2	1.2	1.2
Yugoslavia	6.3	6.2	4.9
Total	222.0	260.4	227.5
Middle East:			
Bahrain	30.1	30.1	30.1
Iran*	531.0	638.0	387.0
Iraq†	189.0	765.0	684.7
Israel	1.0	0.7	0.2
Kuwait	557.9	1,203.9	1,091.5
Neutral Zone	25.0	50.0	29.1
Qatar	89.0	130.9	121.6
Saudi Arabia	719.8	1,054.9	1,041.1
Total	2,142.8	3,873.5	3,385.3
Other Asia:			
British Borneo	117.0	117.0	115.6
Burma	4.5	4.5	4.4
India	9.2	9.2	5.7
Indonesia	270.0	280.0	236.6
Japan	5.9	5.9	6.4
New Guinea	7.3	7.3	7.9
Pakistan	5.7	5.7	5.8
Total	419.6	429.6	382.4
Free World:			
Foreign	6,544.6	8,251.8	7,246.0
United States	7,139.0	6,966.0	7,013.0
Total Free W.	13,683.6	15,217.8	14,259.0
Communist countries in Soviet Orbit:			
Romania	200.0	200.0	150.0
Russia	1,600.0	1,600.0	1,400.0
Others	50.0	50.0	50.0
Total	1,850.0	1,850.0	1,600.0
World total	15,533.6	17,067.8	15,859.0

*Includes estimated 4,000 bbl. daily from Naft-i-Shah field not operated by consortium companies. †Includes estimated 5,000 bbl. daily this year and 12,000 bbl. daily in 1955 from Naft Khaneh field, operated by British Petroleum Co. rather than I.P.C.

Figures are from reliable reports in the industry or official government sources. Data for Russia and Eastern Europe are based on competent estimates; no authentic information is available on month-to-month production in these areas. Estimates also have been made for other countries, particularly in Southeast Asia, where complete current reports are lacking. Communist countries in the Soviet orbit include satellite countries in Europe and Red China.

TREND OVER THE LAST YEAR

	Western Hemisphere less U. S.	Middle East	Total, non-Communist countries
1955—			
November	3,250.8	3,385.3	7,246.0
December	3,298.5	3,316.1	7,227.2
1956—			
January	3,363.7	3,392.6	7,368.5
February	3,426.2	3,415.7	7,453.4
March	3,471.2	3,624.3	7,713.8
April	3,320.5	3,736.6	7,690.8
May	3,356.7	3,793.9	7,788.1
June	3,519.1	3,713.7	7,871.7
July	3,549.8	3,806.1	7,996.6
August	3,618.2	3,685.8	7,965.6
September	3,637.2	3,721.8	8,019.3
October	3,688.3	3,873.5	8,251.8
November	3,760.2	2,142.8	6,544.6

Middle East hit hard . . . Iraq output was limited to offtake at the Persian Gulf terminal of Fao and to local consumption. This was due to destruction of pumping stations in Syria on the lines from Kirkuk field to the Mediterranean. Saudi Arabian output was curtailed somewhat due to its ban on shipments to France or the United Kingdom.

Kuwait, normally the top producer, was down 53.6 per cent. Saudi Arabia, ordinarily in second place, was down 31.8 per cent. Iraq was off 75.3 per cent; Qatar, 30.2 per cent; and Neutral Zone, 50 per cent.

Iran fared best. Its decline of 107,000 bbl. daily was a comparatively small 16.8 per cent drop. Bahrain held its own with an output of 30,100 bbl. daily.

Egyptian fields damaged . . . Some damage was done to Egypt's Sinai Peninsula fields during the fighting. Currently there is no production anywhere in the country. Sinai fields were the only ones in the Middle East area damaged during the crises—other than isolated cases of sabotage.

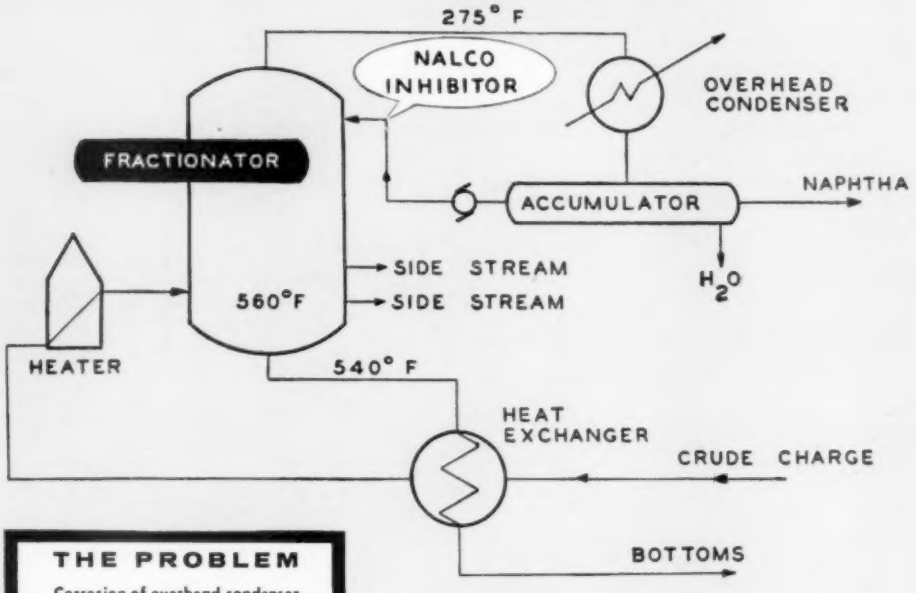
Fields on Sinai in which Socony Mobil Oil Co., Inc., has half interest were shutdown early in November. The wells themselves were not damaged by invading forces. But pumps, motors, and other surface facilities were.

Socony is now back in possession of the fields: Ras Sudr, Asl, and Ras Matarma. Some production may resume in February. Normal production is about 9,500 bbl. daily.

Anglo-Egyptian Oilfields, Ltd., held the remaining half interest in the fields. This interest, plus its producing areas on the Egyptian mainland, and its 44,000 bbl. Suez refinery were taken over by the Egyptian Government.

Fires in two other Sinai fields, Feiran and Belayim, were seen from the Socony-Anglo-Egyptian area, and damage was probably more extensive. These fields are held by International Egyptian Oil Co.

HOW *Nalco* INHIBITORS CUT DOWNTIME 74% ...AND SAVED THIS FRACTIONATING TOWER



THE PROBLEM

Corrosion of overhead condenser and tower internals. Because of corrosion, early replacement of the tower was contemplated.

THE TREATMENT

Nalco Corrosion and Fouling Inhibitor applied into overhead reflux.

THE RESULT

In this case only one point of application protected both fractionator and overhead equipment. Iron in accumulator water brought below 0.3 ppm as compared to previous 100-150 ppm. Corrosion and plugging stopped, tower saved, and downtime for cleaning reduced by 74%.

EFFECTIVE Nalco corrosion control is very low-cost protection. For example, this refinery not only avoided the cost of a new tower, but cleaner tower internals actually resulted in better fractionation and higher quality products. If you would like further facts on Nalco Corrosion and Fouling Inhibitors, ask your Nalco Representative or write direct.

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The Flox Company, Inc., Minneapolis 3, Minnesota
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THE *Nalco*® SYSTEM... SERVING INDUSTRY THROUGH PRACTICAL APPLIED SCIENCE

Venezuela Will Grant New Concessions

- **Both majors and independents are expected to compete in bidding for tracts in five regions. New offering will include both Lake Maracaibo and interior tracts**

- **Bids will close February 11 in this second bidding of recent months. Minimum bids range from less than $50 to more than $700 an acre**

A SCRAMBLE for new concessions in Venezuela is sure to develop next week. The Venezuelan Government last week threw open long-coveted blocks in five regions for bidding.

Applications and bids for the blocks must be submitted to the Director of Hydrocarbons in Caracas by 5 p.m. February 11. Major firms already operating in Venezuela, plus many smaller firms and independents eager to get a toehold, are expected to bid.

The bidding will open up development in four other areas besides the fabulous Lake Maracaibo. Concessions also will be opened in Gulf of Paria, North and South Monagas, and Barinas Portuguesa.

The concession areas include:

. . . **Lake Maracaibo.** Lots 10, 12, 17, 20, 21, and 24, for exploration. Minimum bid is set at 6,000 bolivars a hectare. At present exchange rates, this amounts to about $728 an acre.

. . . **Gulf of Paria.** Lots 1 to 16 inclusive for exploitation. Minimum bid of 1,200 bolivars a hectare, or about $360 an acre.

. . . **North Monagas.** Lots 1 through 4, for exploitation. Minimum bid is 1,200 bolivars a hectare. Lots 5 through 7 for exploration. Minimum bid is 300 bolivars for the first year of exploration and 1,200 bolivars for the initial exploitation tax.

. . . **South Monagas.** Lots 1 through 32 for exploitation. Minimum bid is 1,200 bolivars.

. . . **Barinas Portuguesa.** Lots 1 through 20 for exploitation. Minimum bid is 1,200 bolivars. Lots 21 through 28 for exploration. Minimum bid is 300 bolivars (about $36 an acre) for first year of exploration and 1,200 bolivars for the initial exploitation tax.

New condition . . . A new condition has been added to the agreement successful bidders must make on taking up the concessions.

The company must agree to take exploration concessions in bordering areas of the country. These areas will be designated by the national executive. Their size will be proportionate to size of company's concession in the other zones. Maximum will be 40,000 hectares.

Payment for these bordering concessions will be: 150 bolivars per hectare for the first year of exploration and 100 bolivars per hectare as the initial exploration tax.

One other stipulation was placed on the bidding. The successful bidder must deposit in the Central Band the amount paid for the block. He must make the deposit within 8 days after being notified verbally by the minister of hydrocarbons that his bid is accepted.

Interest is high . . . The old familiars in Venezuelan oil are expected to be on hand for the bidding. Many others are expected to get into the act.

The Lake Maracaibo blocks, naturally, will attract big attention because of tremendous production reserves already established there. But the Barinas and Monagas areas will be inviting as well as the Gulf of Paria area. The latter is across the gulf from offshore activity under way in Trinidad.

The official announcement cleared up one bit of confusion. It showed that Lot 10 in Lake Maracaibo has been taken from Venezuelan American Independent Oil Producers Association. It had been rumored earlier that Venezuelan American had regained possession of the 26,751-acre lake block. The government had cancelled the grant because Venezuelan American failed to make the required deposit by the deadline.

The company had bid $19,800,000 but failed to pay the bonuses within the required month. Earlier Venezuelan American lost its border concessions but still holds the Northwest V-575 concession of 1,970 acres. This is farmed out to Sun Oil Co. and Atlantic Refining Co.

Venezuelan American only last week approached U. S. oil companies with offers to sell the block. Reports were that the company was asking for the cost of the lease plus 20 per cent, plus a 6 per cent override.

Another loss . . . Four concessions of Star Oil Co. in the State of Apure also were canceled for nonpayment of the first annual exploration tax. The four exploratory "border" concessions covered 98,840 acres.

Big stakes . . . Some American operators questioned whether the new sale would be highly successful.

One remarked: "If only the absolute minimum were offered, the new lands offered would require between $380 and $400 million in bonuses. I just don't think the industry has that much money to put into the properties."

Conditions placed on the acreage are the same as those as encountered in bidding last summer for Venezuelan blocks. They include:

. . . **An exploitation tax** of one-sixth of all oil produced to be credited to the government.

. . . **Concession holders** must refine in Venezuela at least 15 per cent of all crude produced. The figure formerly was only 10 per cent.

. . . **No flaring of** natural gas. Companies will be compelled to cooperate with the government in establishing a national network of natural-gas pipelines to conserve gas produced. The government claims one-sixth of the gas.

. . . **An additional** 8 per cent production tax will be charged against all crude produced that is refined outside Venezuela but in the Caribbean area.

Reds Plan Deep Test

17,060-ft. test planned on peninsula in Baku area

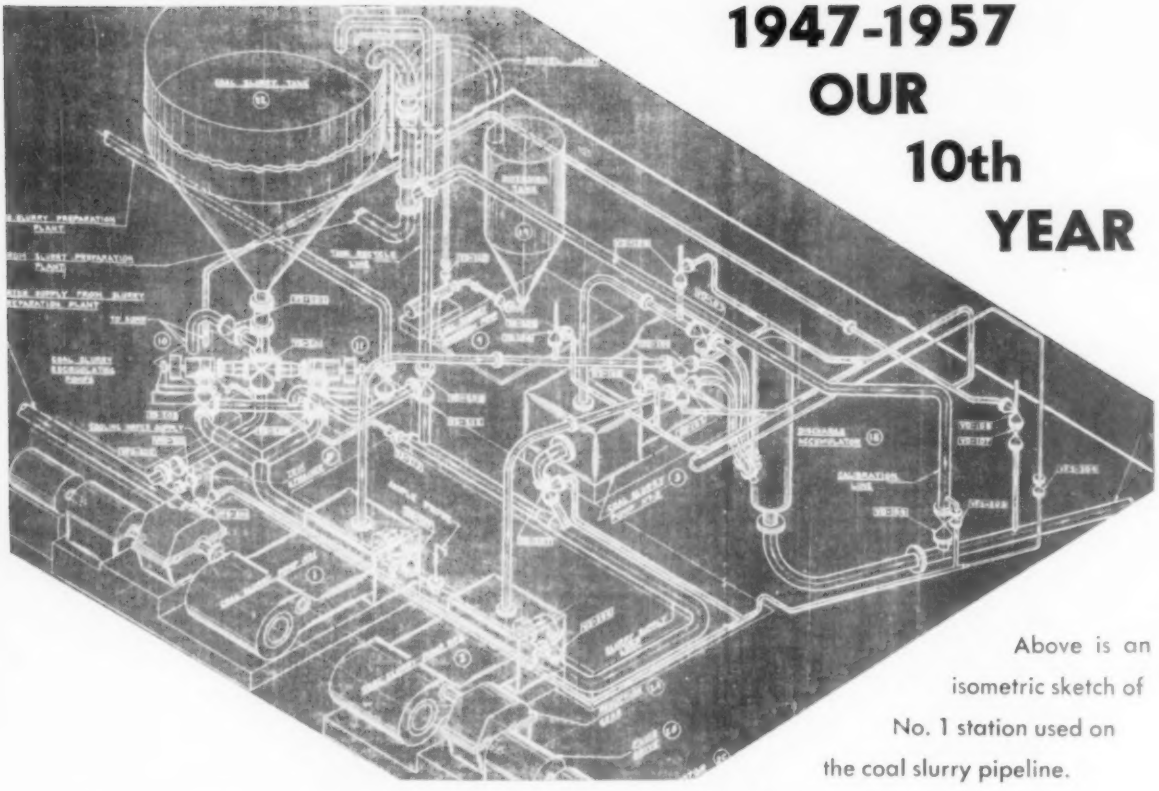
RUSSIA hopes to establish new European records for deep drilling in the Azerbaijan Republic during 1957.

The U.S.S.R. Ministry of the Oil Industry has set a goal of 17,060 ft. for a well at the town of Zyr on the Apsheron Peninsula, near Baku. It is here "the deepest oil well in Europe" was bottomed at 15,787 ft. in 1955 and now is producing.

The 1955 well was drilled in 18 months with a rotary rig, using a special derrick 174 ft. high which had a 300-metric-ton lifting capacity. Soviet reports say that this well "has confirmed belief that oil in commercial quantities can be found in lower formations on the Apsheron Peninsula."

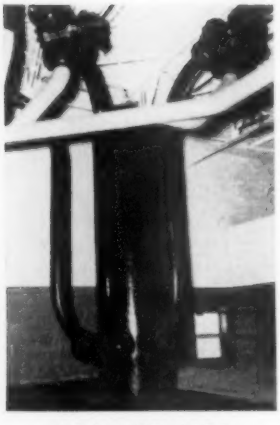
Turbodrills are being used at several other deep wells now being sunk around Zyr. One of these—Well No. 1307—has reached a record turbodrill depth of 14,632 ft.

1947-1957 OUR 10th YEAR



Above is an isometric sketch of No. 1 station used on the coal slurry pipeline.

First Three Coal Slurry Pipeline Stations Completed Ahead of Schedule!



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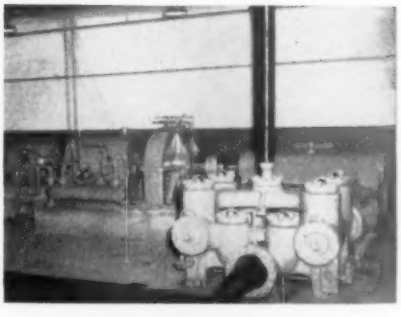
We are indeed proud to have been the prime contractor on the three original coal slurry stations. Our 1956 record includes six main line pressure installations—four crude oil booster stations—and a products station. Fourteen separate projects in four different states. All ahead of schedule.



COAL SLURRY PUMP

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CRUDE — GAS — PRODUCTS — SLURRY
CONTACT

POLING & BACON CONSTRUCTION CO., INC.

BOX 71, STATION A, TOLEDO, OHIO and BOX 267, POLAND BR., YOUNGSTOWN, OHIO

Prices Adjusted

Gulf juggles its boosts in West Texas and Venezuela

GULF OIL CORP. and its Venezuelan subsidiary last week adjusted crude prices raised last month. Some of the recent raises were reduced and others boosted.

In the United States, Gulf shaved 5 cents from the 30-cent increase it posted January 8 for West Texas and New Mexico crudes. Company officials said the cut would bring Gulf into line with "most competing purchasers."

In Venezuela, Mene Grande Oil Co., Gulf's subsidiary, juggled nearly every phase of its most recent posting on January 12. Some crudes were reduced as much as 8 cents. Others were increased as much as 25 cents. Some were left alone except for changes in the gravity differential.

Mene Grande's 41.0-41.9° Anaco wax crude was left at $3.34. But the company increased the scale for each half-degree of gravity change from 2 cents to 2.5 cents. The 30.0-30.4° Mesa crude was reduced 8 cents to $2.79, with no change in gravity differential.

On Leona crude in the 24.0-24.4° range, the posting was cut 5 cents and the differential for each half-degree gravity change reduced from 3 cents to 2.5 cents. Temblador crude, 20.5-20.9°, was increased 15 cents to $2.55. Bachaquero crude, 14.5-14.9°, was upped 17 cents to $2.25.

A new posting of 17.0-17.4° for Taparito crude was listed and the price increased 9.5 from $2.15 to $2.20.

Lagunillas crude was boosted 5 cents to $2.38; Cabima, 20.0-20.4°, 15 cents to $2.35; Mara crude, 29.5-29.9°, up 25 cents to $2.65. There was no change in the $3.40 posting for Santa Rosa condensate.

New Firm to Test Australia

A new company is being formed to drill for oil in the Queensland province of northeastern Australia.

South Pacific Co., an American-backed Australian corporation, will carry out the search on 4,480,000 acres making up the Mantuan Downs concession. The area is about 450 air miles from Brisbane.

Joseph L. Hargrove, partner in Hargrove Oil & Gas Co. of Shreveport and vice president of the new firm, is in Australia to supervise drilling operations. Scheduled depth is about 8,000 ft. Extensive explorations have been carried out in the province.

R. R. Herring, president of Fish Service Corp. in Houston, is president of South Pacific. The company also holds an undivided one-half interest in the 8,600,000-acre West Winton concession to the west of Mantuan Downs.

T.C.C. Units Spread

Process in and building at 21 plants outside the U. S.

A 9,000-BBL. airlift thermofor catalytic cracking unit is going in at the 18,000-bbl. refinery now under construction by Neste OY at Turku, Finland.

The T.C.C. process, developed and licensed by Socony Mobil Oil Co., is already in use at 20 refineries outside the United States. Daily total capacity of these units is 170,700 bbl. Some of them have been on stream as long as 6 years. Companies using them are:

AGIP Mineria, 2,800 bbl. daily at Cortemaggiore, Italy; Antar Petroles des Antlantique, 10,500 bbl. at Donges, France; Aquila, S.p.A., 3,000 bbl. at Trieste, Italy; Chinese Petroleum Co., 10,000 bbl. at Kaohsiung, Formosa; Condor, S.p.A., 15,000 bbl. at Milan, Italy; Deutsche Erdol, A.G., 7,700 bbl. at Heide, Germany; Gelsenberg Benzin, A.G., 10,000 bbl. at Gelsenkirchen, Germany.

Mobil Oil, A.G., 8,700 bbl. at Bremen, Germany; Mobil Oil Co., Ltd., 12,000 bbl. at Coryton, England; Mobil Oil Francaise, 18,000 bbl. at Frontignan, France; Mobil Oil Italiana, S.p.A., 22,000 bbl. at Naples; Petroleos Mexicanos, 10,000 bbl. at Minatitlan, Mexico; Purfina, S.p.A., 1,500 bbl. at Genoa, Italy; Purfina, S.p.A., 1,500 bbl. at Rome.

Ruhrchemie, A.G., 3,400 bbl. at Oberhausen, Germany; SACOR, S.A., 10,600 bbl. at Cabo Ruivo, Portugal; Soc. Cherifienne des Petroles, 1,800 bbl. at Petitjean, Morocco; Standard-Vacumm Oil Co., Ltd., 9,200 bbl. at Melbourne, Australia; Refineria Uniao, S. A., 10,000 bbl. at Capuava, Brazil; and Turkiye Petrolleri A. O., 3,000 bbl. at Batman, Turkey.

Iraq's Income from Oil Drops

The Iraq Government's receipts from Iraq Petroleum Co., Ltd., declined more than 7 per cent last year due to the loss of revenue after the company's pipelines to the Mediterranean were disrupted in November.

The fourth-quarter payment of nearly $28,000,000 brought the total for the year to $190,000,000, compared with $207,000,000 in 1955. The government shares profits with I.P.C. on a 50-50 basis. It had expected revenues last year to pass $224,000,000.

World briefs

Continental Oil Co. has taken preliminary steps for possible expansion of its operations to Venezuela. A newly formed subsidiary, Continental Oil Co. of Venezuela, has been incorporated in Delaware and will seek several onshore concessions in Barinas basin and elsewhere.

British Malayan Petroleum Co., the Royal Dutch-Shell company which produces more than 100,000 bbl. of crude daily at Seria field in Brunei, British Borneo, plans to change its name to Brunei Shell Petroleum Co.

Cie. Francaise des Petroles (Algeria) has applied for two new 5-year exploration permits in southern Algeria. One covers an area of 11,200 sq. km. in the area near Ouargla where S. N. Repal claims a major oil discovery. The other covers 6,500 sq. km.

Gulf Oil Corp. has set up one new foreign subsidiary and changed the name of another. The new company, Gulf Oil Co. of Libya, will seek lease concessions in that north African country. The name change was in West Germany where the Gulf subsidiary Maschinenoel Import G.m.b.h. was renamed Gulf Oil (Germany) G.m.b.h. Gulf pulled out of Italy last week.

A pilot plant for synthetic rubber is being operated in Birmingham, England, by Dunlop Rubber Co. Built at a cost of $1,700,000, it will provide information for a bigger project planned at Southampton by International Synthetic Rubber Co. The Southampton plant, backed by the rubber majors, is scheduled to produce 50,000 tons a year. It will be completed within the next 2 years.

"Shell" Transport & Trading Co., Ltd., is in the preliminary stages of listing its stock on the New York Stock Exchange. The British firm is one of the two parent companies of the Royal Dutch-Shell Group, with 40 per cent interest. Royal Dutch Petroleum Co. holds the remaining 60 per cent of the operation.

Russia has brought in another good producer at a new field in the Sunzha Mountains near Grozny. Drilled to about 7,900 ft., the Karabulak well has flowed 1,000 metric tons of oil in an unspecified period. It is the fifth "gusher" to be completed in the area during the past year and, according to Soviet reports, "shows the great possibilities of the Sunzha Range fields."

OIL FRONTIER GUIDE

Unsuspected pay formations in wells already drilled or now drilling have been called *today's greatest frontier for oil discovery*.

As their guide to this richly promising frontier, well-wise oilmen call for Halliburton Electrical Well Services . . . *only* forward-looking family of logging techniques that offers minimum-error FM data transmission.

With quickening pace, Halliburton logging moves into the future of geo-electronics to bring you tomorrow's methods today. In personnel training, quality of equipment, improved interpretation methods, Halliburton dynamically improves the quality of its service to you and your well.

Remember this. There may be more oil, undiscovered, behind your own bore hole sidewalls than in this week's biggest new strike. Look for it through the searching electronic eyes of Halliburton logging.

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finds cement top with fast run-in

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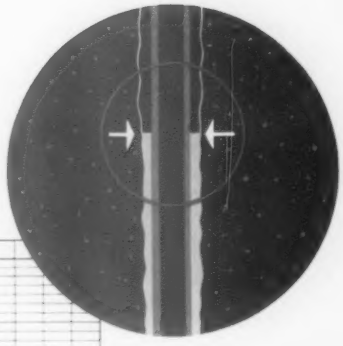

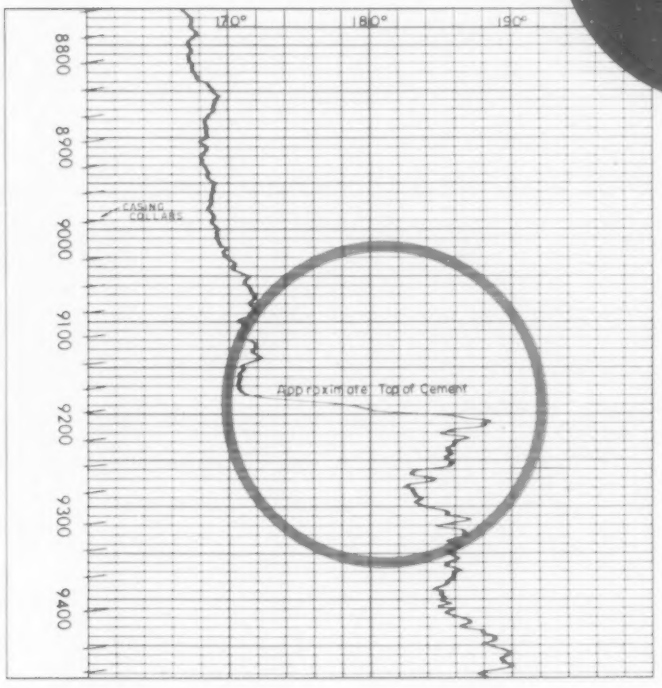

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Countless hours of rig time have already been saved for drillers by Halliburton's new, rugged, super-sensitive temperature survey tool!

With more rugged structure, micrometric responsiveness to small temperature variations, and virtually errorless transmission to surface by frequency modulation, this tool can be run faster than older types and still record unmistakeable discontinuities at cement tops even for high admix cements with low heat of hydration. Survey can be correlated with casing collars, as shown in sample curve.

For locating high-pressure gas zones or lost circulation depths while drilling... finding top of cement and recovering maximum pipe after well completion . . . see your Halliburton EWS field engineer about using this fast, reliable temperature survey.

Ask for authoritative 46-page study, "Temperature Well Logging"

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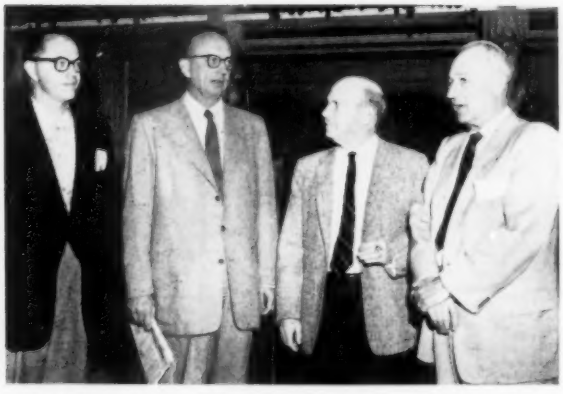
John H. Williams, Williams Brothers Co., Tulsa; and Harold C. Price, H. C. Price Co., Bartlesville, Okla.

Earl Allen, Associated Pipe Line Contractors, Inc., Houston; and W. C. McGee, Jr., Tennessee Gas Transmission Co., Houston.

R. L. Bowman, San Francisco; and J. L. Work, Tulsa, both of Bechtel Corp.

At Boca Raton . . .

Pipeline contractors mix fellowship and shop talk



E. J. Mahoney, Jr., Bechtel Corp., San Francisco; Earl Allen, Associated Pipeline Contractors, Inc., Houston; E. R. Osburne, Fish Engineering Corp., Indiana, Pa.; and G. B. Pace, Pipe Line Construction & Drilling Co., Camp Hill, Pa.

Robert L. Buck, Williams Brothers Co., Tulsa; Stephen D. Day, S. D. Day Co., Houston; S. L. (Dutch) Richards, Jr., Rosson Richards, Houston; and Arthur E. Poole, Hallen Construction Co., Island Park, New York.

Jack S. Gray and E. E. Wilkerson, both of Grayco Constructors, Inc., Austin; Milton L. Williams, Williams Pressure Service, Shreveport; and Robert L. Buck, Williams Brothers Co., Tulsa.

R. P. Gregory, Houston Contracting Co., Houston; C. C. Bledsoe, Midwestern Constructors, Inc., Tulsa; S. V. (Sammy) Collins, Collins Construction Co., Port Lavaca, Tex.; and Donald Woodard, Associated Pipeline Contractors, Inc., Houston.

. . . and hear panel tell why . . .

Safe pipelining is more profitable pipelining

CARL C. LAVERY
Houston Contracting Co.

IF you have a poor accident record, the rates for your insurance are going to be high, and, conversely, if you have a good record, your insurance rates are going to be lower. This applies to the pipeline construction industry as a whole just as it does to the individual contracting organizations making up the industry.

An active accident-prevention program carried on intelligently in our own organizations will bring down the losses we sustain ourselves, and will result in the rating bureaus giving that contractor a credit against the industry's manual rate. With this beginning, and with all contractors working toward the same end, the loss experience for the industry will drop, and so will the manual rate. . .

Of the many plans offered . . . we would like to call to your attention the so-called "retrospective plan" of insurance . . . as an example of what may be done by having a good accident-prevention program and the cutting down of insured losses.

The plan outlined is subject to a lot of modifications for different contractors, and for different operating conditions, but generally speaking for the contractor who has an insurance premium of say $100,000 per year for his workmen's-compensation coverage, this plan would permit him to recover $51,665.40 of the contractor's yearly $100,000 premium if he keeps losses down to 25 per cent of the total premium. If the contractor has a loss ratio of 40 per cent then he will get back $34,130.80 and, if he has a 50 per cent loss ratio, he will reduce his costs by $22,434.40. Even with a 65-per cent loss ratio he will receive $4,889.80 in returned premiums. Those contractors with a very poor exerience rating will find that with a 75 per cent loss ratio they will owe the insuring company an additional $6,806.60 in premium, and if the ratio rises to 85 per cent or above, the indicated additional premium to the insuring company becomes $18,503.

B. G. PIERCE
H. C. Price Co.

WHILE it is impossible to build pipelines without some destruction of property, it is possible to build them without needless destruction. Furthermore, sound business judgment dictates that we should do so for the very simple reason that elimination of property damage pays handsome rewards in dollar savings to the pipeline owner and constructor alike. Unnecessary destruction of property is principally thought of as off right-of-way damage, but it includes damage on the right-of-way as well. When either the pipeline owner or property owner has indicated that special conditions exist on the right-of-way, it is the responsibility of the constructor to act accordingly. . .

We have already touched upon the second point that I want to discuss, which was the effect of property damage. In plain terms, it is expensive. Just how expensive it is may be readily determined by all of you through a look at your insurance rates and a quick review of past damage claims which you have had to pay, or which the pipeline owner had to assume.

There is another important aspect to property damage in public relations. To many property owners, the greatest contact with the pipeline owner whose lines cross their property is through the contractor. The impression left by the constructor is the impression he has of the pipeline owner. . . If everybody that the pipeline owner has to deal with is resentful, you can be sure that the pipeline owner will be aware of it in his future dealings with you.

One final point I want to discuss is what can we do about improving our record. . . Two things that we at H. C. Price Co. have found most valuable in this line are making a presurvey of existing property conditions before our crews proceed along the right-of-way and making a final investigation after they have completed their work.

There are three principal causes behind our problem. They are:

1. Lack of adequate training and instruction to all employes.

2. Lack of enforcement of rules, which is the responsibility of all field supervisors.

3. Lack of management interest and support.

Spread Men Get Safety Awards

AT the recent meeting of the Pipe Line Contractors Association, several awards were made to spread men for turning in good safety performances on their spreads. Here are the honorees, identified by the company, and their records. The records are based on number of man-hours worked, and show lost-time accidents and frequency rate.

OVER 100,000 MAN-HOURS

Company and spread man—	Man-hours worked	Lost-time accidents	Freq. rate
H. C. Price Co. (R. L. Ezell)	412,932	1	2.4
H. C. Price Co. (G. A. Reutzel)	382,112	1	2.6
Houston Contracting Co. (E. C. Norris)	351,952	1	2.8
H. C. Price Co. (W. H. Olrich)	567,463	3	5.3
Houston Contracting Co. (H. L. Muckley)	323,279	4	12.4
Eastern Pipeline Cont. (R. H. Dodson)	195,436	3	15.4
H. C. Price Co. (C. E. Shivel)	492,297	8	16.3
Brodie Construction Co. (W. J. Fenn)	163,927	3	18.3
Engineers Ltd. Pipeline Co. (M. H. Cook)	196,360	4	20.4

25,000 TO 100,000 MAN-HOURS

Engineers Ltd. Pipeline Co. (F. P. Smith)	94,910	2	21.1
Eastern Pipeline Cont. (A. J. McIntyre)	65,563	2	30.5
Pentzien, Inc. (John Hahn)	50,308	2	39.8

NO LOST-TIME ACCIDENTS

Dutton-Williams Bros., Ltd.:		Buck Coker	30,660
R. G. Murray, Jr.	51,834	T. J. Coleman	19,550
Trojan Construction Co.:		H. E. Creed	14,000
W. B. Winfrey	16,645	A. E. Culpepper	12,055
Cape Construction Co.:		Brice Davis	11,990
R. C. Whitworth	13,761	Harry Eason	10,500
J. O. (Red) Willett:		Jim Harrist	14,500
Fred Britton	18,500	Bill Matthews	6,500
Cecil Carter	12,500	J. L. Huckaby	22,500
J. W. Cathey	21,500	Red Jinks	13,560
		Newman Smith	13,000

W. A. Swinerton, of Engineers Limited Pipeline Co., San Francisco, at microphone, discussing problems of building slurry pipelines at a panel session during the recent meeting at Boca Raton, Fla., of the Pipe Line Contractors Association. Others at the table are Fred Culpepper, Ford, Bacon & Davis, Inc., New York; David R. Williams, Jr., Williams Brothers Co., Tulsa; and C. C. Bledsoe, Midwestern Constructors, Inc., Tulsa (presiding).

Boca Raton panel explores how . . .

Slurry pipelines raise special problems

MOST of the unusual construction requirements of a slurry pipeline are the result of a limitation on the slope of the line. This limiting grade is established during pilot-plant tests of the materials' behavior under an anticipated operating range of velocities, particle sizings, and water-solids ratios. Engineering and economic evaluation of these tests sets the limit as a balance between the cost of extra footage and heavy grading against operational and safety advantages gained by reduced precipitation.

The grade limit provides for good behavior of the slurry and permits a shutdown period long enough for minor emergency repairs before clogging of the sags occurs. The selected limit for the Pittsburgh Consolidation Coal Pipe Line was 18 per cent on grade and approximately 10° of vertical bend at any one point.

Thickness Allowance

Another cause of additional construction requirements of a slurry pipeline is the wall-thickness allowance for abrasion. This allowance is made also as an economic decision, balanced against the cost of reconditioning and replacement of sections of pipe during the useful life of the line. Most of the abrasion occurs in the bottom half of the pipe and the line could be theoretically rotated at its half life. The cost of rotating and the interim replacement of more severely worn sections justifies a considerable initial investment in extra metal.

Comparative costs . . . Because the abrasion is less with each mile the slurry travels, the abrasion allowance diminishes in successive sections of the line, beginning with .667-in. wall thickness and ending with .375-in. wall thickness in the case of the Ohio coal line. The average wall thickness for this 108-mile line amounted to nearly twice the metal that could be expected for a products line of similar operating pressures.

After adjusting our cost records to eliminate the effect of unusual weather conditions and the layover of our spread during the winter season, the cost of installing the coal-slurry pipeline is estimated to be approximately 1.6 times the equivalent cost for a normal 10-in. products line on the same right-of-way.

The grading costs were more than four times that normal for the similar products line, and the ditching, welding, and cleanup costs all exceeded twice the comparable products line costs. The 40-in. cover requirements explain some of the ditch cost, and the extra metal was responsible for the unusual welding cost. Other cost features were increased from only a slight amount to nearly double in the case of supervision and stringing. The supervision cost was increased partly by the engineering parties required to maintain and check the ditch grade and the bending. The stringing was increased by the additional shifting of equipment to place the proper wall thickness of pipe in the proper locations.

Special problems . . . Noteworthy in the construction as might be anticipated was the procedure used on the heavy-wall pipe to prevent stringer-bead cracking. An immediate stripper pass was required, closely followed by a filler pass before cooling occurred. Also it might be noted that the grading experienced cuts of approximately 40 ft. at breakover points even though the line was located as nearly parallel to the contour lines as possible. These cuts were double benched to permit the spoil to be removed. Most of the volume of the grading, however, occurred by reason of following the contour of the land and the resulting high percentage of side-cutting to level the right-of-way.

Part of the additional cleanup cost was in replacing this material to its original condition. We believe a wider right-of-way than the 30-ft. width desired by the owner might have reduced the difficulty of the work. Passing of equipment where the sidecuts existed was impossible. Special construction space had to be arranged to handle the spoil from the heavier cuts. Access roads were also increased by the many one-way passages.

Editor's note: The above article was digested from a talk by David R. Williams, Jr., before the panel.

SPECIAL PIPELINE CONTRACTORS Section

By C. C. BLEDSOE,
1956-1957 President, Pipe Line Contractors Association

THE PIPELINE CONTRACTOR

. . . and what he has meant to the industry

THERE is no greater tribute to the pipeline-contracting industry than the fact that its ability to build pipelines anywhere, under almost any conditions, is taken for granted by its clients. Contractors don't get enough credit for the seemingly impossible services they perform. The oil and gas companies over the past several years have come to rely more and more on the contractors to do all their work. Now companies contract virtually all construction. There are rare exceptions, and these are usually for specific purposes such as experimentation or to develop cost data.

Reliance on Contractors

Companies which for years did their own work have given up the practice. They found they couldn't build a line themselves as economically as it could be contracted. The development of an efficient, highly competent contracting industry has had a profound impact on pipelining. It has meant stability through knowledge that a job could be finished when it was needed. It has meant flexibility of action because there is a spread ready to move in almost immediately anywhere a pipeline needs to be built. The development of pipelining to its present degree of efficiency has meant lower costs of transmission, and the speed with which projects are completed has meant that investment capital need not be tied up for so long a period.

Another indication of the confidence placed in the contractors is the trend toward giving them the job of engineering as well as construction. This service may be offered by comparatively few contractors, but it has become more widespread in recent years. There is also the tendency for companies to rely more on the judgment of the contractor for on-the-spot construction decisions which must be made.

In addition many companies now have the contractors do part of the purchasing. They often buy coating materials because they are able to cut wastage as much as 10 per cent. While this saving is certainly desirable it does place on the contractor the added responsibility of helping to finance part of the material costs. Some companies specify the coating and the price to be paid for it. Others give specifications only, leaving other decisions to the contractor, and that seems to be an advantageous method of handling the matter.

New Techniques

Competition has forced contractors to develop efficiency which enables them to cut costs. It has kept them on their toes to perfect new methods which will give them—and consequently their clients—an advantage. Equipment manufacturers have had an important role in the development of new techniques which have

cut costs and speeded pipe laying. They have improved standard equipment and produced new machines to fill new needs. They have made equipment which will take the extreme abuse common on a main-line spread. And they have stood behind that equipment.

One of the more significant pipelining developments in recent years is double jointing, a technique which is being employed fairly widely in the plant and in the field. Welding 30 and 40-ft. pipe into 60 and 80-ft. sections has increased particularly in the past 2 years. This faster progress of a spread has cut construction costs anywhere from 6 to 12 per cent.

The possibility for savings is obvious. A spread can lay 150 80-ft. joints in nearly the same time it takes to lay 200 40-ft. joints; in other words, under good conditions, pipe laying can be speeded 50 per cent, if the terrain is not too rough. This speed permits the contractor to take better advantage of good weather.

Double jointing is not without its problems, of course. A 60-ft. joint is as easily handled as a 40-ft. joint. But when you start handling 80-ft. pipe, you can run into trouble fast, particularly in close quarters. There is considerable difficulty in turning on narrow roads. But this problem of stringers may be alleviated by special equipment.

Industrial Peace

A major contribution to the stability of the pipeline industry has been the industrial peace which has prevailed for several years. There have been no delays because of work stoppages growing out of labor disputes. In fact, there hasn't been a major strike on a contractor's spread in years. There have been a few so-called "wobbles," when gangs were off for a few hours or half a day, but we haven't been hit by a real strike in some time.

Labor accord is no accident. It did not just happen. The industrial harmony which we have enjoyed is the result of a tremendous effort to work out mutual problems with the labor unions, and a better understanding with those who represent the unions. The prime mover in this drive has been the Pipe Line Contractors Association. It recognized the importance of this matter and was primarily responsible for working out the present 5-year contracts which assure long-term stability to contractors and their clients.

The author with Paul Reed, Journal pipeline editor.

Harmony has come from better understanding, which is an outgrowth of becoming better acquainted with our union friends when we sit down at the bargaining table. Perhaps the key to our success is the fact that the contractors themselves deal with union representatives. There are no hired company negotiators. Out of this personal contact has arisen a respect which has dispelled the animosity and mistrust which formerly clouded union-contractor relations.

It goes without saying that the benefits of labor peace have accrued to contractors and pipeline companies as well. We no longer need to worry about strike-imposed delays which not only add to the cost of construction but upset the well-laid plans of companies which depend so completely on our services.

Safety

Another vital area in which great strides have been made is safety. Again it is the contractors association which has been largely responsible. The postwar construction boom brought with it a shocking rate of accidents and disabling injuries. Besides the human tragedy, there were costly delays and higher operating costs boosted by insurance rates which climbed with the accidents.

Today, this picture has been altered sharply. Injuries and damage claims are down, although some phases of operation—such as blasting—still remain a problem. Insurance rates are down accordingly, and spread efficiency has risen in inverse ratio to the falling accident rate. A major share of the credit for safety improvements belongs to the spread superintendents, whose attitudes have an important bearing on the success or failure of the program.

Company-Contractor Relations

The progress of any pipeline project depends almost as much on the pipeline company as the contractor who is actually doing the work. Lack of cooperation in any one of a number of important phases can stymie a project just as seriously as the weather, a strike, or an accident. What helps more than anything else is for the company to facilitate materials and right-of-way. If the company gives the contractor a place to work, materials to work with, prompt payment, and keeps retainage at a minimum, the contractor can give him a better bid. Lack of cooperation and unreasonable

"A major contribution

to the stability of the pipeline industry has been the industrial peace that has prevailed for several years. There have been no delays because of work stoppages growing out of labor disputes. In fact there hasn't been a major strike on a contractor's spread in years. There have been a few so-called 'wobbles,' when gangs were off for a few hours or half a day, but we haven't been hit by a real strike in some time."

demands will inevitably lead to higher bids on projects for a company with this reputation.

The subjects of bidding and obtaining contracts, the heart of company-contractor relations, are the most controversial phase of their relations, and the one in which there is perhaps more room for improvement. A contractor's position on bid vs. negotiated contracts depends on whether he is on the inside or outside. If he is on the inside, he is for them. If not, he is left out in the cold.

One of the basic issues on bidding is how many contractors should be invited to submit estimates. Some companies ask as many as 30 or 40. This results in needless expense for a large number of contractors because only a limited number will share in the work. The fairest system, it would seem, and the one that will benefit the contractor with a record for good performance, is to ask only a few to bid on a project.

When a contractor goes to the expense of compiling a sound estimate, he deserves a reasonable chance of getting a part of the project. Under this system, he will have that chance. Competition will assure adequate protection against unreasonably high bids. Records show that when eight or more contractors bid on the same job and if the award goes to the lowest bidder, then he will lose money or his bid will be too low.

The method of bidding is equally important. Some companies ask for a lump-sum bid, one price for the whole project. Still others bid extra units for the contractor, leaving only the main line for him to worry about. Another method has the contractor bidding on a unit basis.

The author's personal preference is for the last two methods. When the company estimates the cost of extra units, contractors are put on an equal basis. And they don't have to figure out all the phases of a job. Bidding is much simpler and less costly. Unit bids for rock, welding, right-of-way grading, and valve settings at highways and railroad crossings are attractive for various reasons. For one thing, they show the company whether the bids for individual items are realistic. On the contractor's side, provision for paying by the yard for any ditch cut over a certain depth, for example, offers protection against unforeseen contingencies. It also is a fair method of compensation for work actually done.

Construction Activity

The past year has seen a continuation of the high level of construction. On a tonnage basis, if not in miles, more pipe was laid in the United States and Canada than ever before. In spite of the steel strike in July, the mills were able to produce almost 3,400,000 tons of line pipe, some 10 per cent more than a year ago. Every inch that was available went into the ground.

There is nothing in sight to indicate a curtailment of construction in the near future. So long as business remains at a high level, so long as petroleum and natural-gas demand continues to grow, contractors will be laying about as much pipe as the mills can turn out. With an increase in steel capacity and stability assured by 3-year labor contracts, 1957 could well be a bigger year in pipeline construction than the one just past.

There is an entirely new field opening up for pipelining. I refer to high-pressure water lines and lines to transport solids—such as coal and gilsonite—in slurry form. The 108-mile, 10-in. coal pipeline of Pittsburgh Consolidation Coal Co., from Cadiz, Ohio, to Cleveland, and the 70-mile, 6-in. line of American Gilsonite Co. from Bonanza, Utah, to Grand Junction, Colo., will lead to others. The feasibility of slurry lines is well known. They are sound from an engineering standpoint. They will be attractive investments under the right conditions. And the new thinking that has created slurry lines will open up this possibility to others outside the petroleum industry.

"There is nothing in sight to indicate a curtailment of construction in the near future. So long as business remains at a high level, so long as petroleum and natural-gas demand continues to grow, contractors will be laying about as much pipe as the mills can turn out."

High-pressure water lines probably have an even greater future than slurry lines. Some have already been built. There is every reason to believe that more will be built in the future. Lack of an adequate water supply for both industrial and domestic consumption is one of the knottiest problems plaguing the country today. It is very likely that long-distance, big-inch pipelines will have a major role in its solution. The opportunity is one that should materialize and contractors ought to be prepared to take advantage of it.

Contract Prices

Even without these new fields, pipeline projects already announced and others known to be in the planning stage will be enough to keep the industry busy for some time to come. But while construction is continuing at a high level, the contracting industry as a whole has not prospered as it should. Good times have attracted numerous contractors into the business. Competition is keen. And that has spurred all to greater efficiency in order to stay in business. It has kept costs down in contrast to other construction industries. The actual cost of construction apart from materials has not gone up in the pipeline industry during the past 2 years. In fact, it is lower than it was 3 years ago.

In the meantime contractors have absorbed increased costs of equipment to handle bigger pipe, more personnel to handle increased field office work, more engineers to supervise complicated projects, higher costs of parts, and higher fuel costs. Greater efficiency has helped to offset higher costs, but has not done so completely. The upshot is a return which is not adequate to maintain a healthy industry, in view of the high risks of the business.

Fierce competition, while generally healthy and beneficial to contractors and companies alike, has also led to a practice which is harmful to both. This is a tendency to get a job at any price. It has led to some ruinous bids. One such bid, plus some bad luck, is enough to put a contractor out of business. It has happened. It will continue to happen unless more business statesmanship is practiced. A contracting industry that is financially weak is not in the best interest of anyone. Contractors owe it to themselves and to their clients to remain financially sound. The alternative is inability to keep good equipment and personnel which will guarantee the dependable performance to which the companies have become accustomed and which they have a right to expect. **End.**

Who's Who in the Pipe Line Contractor's Association?

Earl Allen, Assoc. Pipe Line Contractors, Inc., Houston, 1st v.p.

John H. Williams, Williams Brothers Co., Tulsa, 2nd v.p.

Kenneth A. Owen, Parkhill Truck Co., Tulsa, treasurer.

Richard A. Gump, Dallas, executive secretary.

Robert A. Conyes, R. A. Conyes Const. Co., San Pablo, director.

Jack S. Gray, Grayco Constructors, Inc., Austin, director.

R. P. Gregory, Houston Contracting Co., Houston, director.

G. Austin Manuel, Williams-Austin Co., Pittsburgh, director.

James P. Neill, J. P. Neill and Co., Dallas, director.

Harold C. Price, H. C. Price Co., Bartlesville, director.

Robert D. Sheehan, Sheehan Pipe Line Const. Co., Tulsa, director.

Maurice S. Williams, Panama-Williams Co., Houston, director.

. . . and what are its functions?

THE comparatively small group which organized the Pipe Line Contractors Association in 1947 has grown into an organization which embraces most of the industry. Representatives of approximately 60 pipeline-construction firms and 80 manufacturers, dealers, and suppliers attended the 1957 convention. The membership includes contractors doing 85 per cent of the crosscountry crude, gas, and products construction.

The association has negotiated labor agreements for pipeline construction which prevail throughout the United States and Canada. The relationship existing between the pieline contractors and union officials has been one of the outstanding accomplishments of the association. It has resulted in much progress toward uniformity in the customs, practices, and cost of labor.

The association has also participated in drafting standardized pipeline welding specifications. It now has representatives assisting in the preparation of coating and wrapping specifications, safety practices, and a recommended bulletin for construction practices.

Richard A. Gump, Dallas, has been executive secretary since organization of the association, which has the following goals:

To make membership a reasonable assurance to the public of the skill, integrity, and responsibility of its members.

To maintain the high standards of the pipeline contracting business and to establish members in the public mind as contractors who fulfill obligations in good faith.

To promote better relations among contractors and between contractors and those with whom they deal.

To seek correction of injurious, discriminatory, or unfair business methods practiced by or against pipeline contractors.

To eliminate as far as possible the occurrence of injury and death to pipeline contracting employes.

Oil and Gas Companies Tell . . .

"How we'd like to deal with pipeline contractors"

and Pipeline Contractors Tell . . .

"How we'd like to deal with oil and gas companies"

. . . via this forum, arranged in question-and-answer form

The questions . . .

1. What is wrong with contract bidding?

2. What do you think of the different types of contracts? . . . i.e., those for unit bidding, or lump sum? . . . what about the handling of extras paid by the company?

3. How do you think the various types of inspection might best be handled? . . . by whom? . . . how?

4. What do you think will be the most significant technical and equipment advances in pipelining in 1957-1958?

5. What do you think are some of the most pressing problems facing the company-contractor relationship in the future?

By F. B. Neptune
Vice President, Phillips Pipeline Co., Bartlesville, Okla.

1. Contract bidding . . . Nothing is wrong with it if both parties conduct it intelligently (it is assumed that the question refers to lump-sum bidding). The owner should assure himself that his award is made to a qualified contractor, and should confine his list of bidders to people of proper qualifications. The bidder should assure himself that he has the know-how and equipment to do the work, and should further assure himself that his price that he bids will give him a fair profit. Lump-sum jobs are beneficial to both owner and contractor in that they cause the owner to crystallize his ideas of exactly what he wants, and they furnish the contractor with an incentive to give the owner the most economical work possible.

2. Types of contracts . . . Both unit-price contracts and lump-sum contracts are entirely workable. The unit-price type is particularly suitable where a moderate variation in the number of identical units may very well occur, whereas the lump sum is more adaptable when the exact quantity of the work is rigidly fixed. Extras are almost always the subject of considerable debate and to generalize their handling is very difficult. From the standpoint of both owner and

By Harold C. Price
President, H. C. Price Co., Bartlesville, Okla.

1. Contract bidding . . . What is meant by contract bidding? All contracts are bid but by different methods, namely, either by open competition, negotiation between the company and the contractor, or by awarding of contract on some sort of cost-plus basis. Many years of experience using all three methods makes us believe that the most satisfactory method of awarding a pipeline contract is by negotiating the contract on a fixed sum. In using this method, the company selects the contractor or contractors who are known to have the construction ability and financial responsibility necessary to build a good pipeline and to complete the work on schedule. The actual negotiation across the table of firm prices creates a better understanding between the company and contractor of the work to be performed, and the agreed upon firm prices are satisfactory and equitable to both parties. This, in turn, eliminates any necessity or occasion for the contractor to submit extra work bills to the company except in rare occasions where there is a necessary and complete change in the construction plans.

2. Types of contracts . . . We see no difference in the type of contract mentioned. Unit bidding or lump sum

Oil and Gas Companies Tell . . .

"How we'd like to deal with pipeline contractors"

contractor it is highly preferable that there shall be no extras at all. This, of course, requires that the advance planning and understanding concerning the work to be done be very exact, which is seldom entirely the case. If the question of extras arises, it is only proper that the two parties make their best effort to arrive at a proper understanding of the correct price and the owner should then pay the contractor that price.

3. Inspection . . . The meaning of the question is not entirely clear; that is to say, what various types of inspection does the questionnaire have in mind? The inspection of the pipe at the mill is sometimes done by qualified oil-company technicians, but also is capably handled in many cases by contract inspection companies. Inspection of the work in the field is probably best handled by the owner's own technical employes. These inspectors may be graduate engineers or they may be experienced welders, pipeline foremen, or people of like qualifications. This will, of course, depend on the owner's custom and the people he may have available.

Various types of organization of the inspectors can probably be employed, but the commonest one seems to be to have this small group of people reporting to a single individual who is responsible for the entire group. The manner in which these inspectors convey their requirements to the contractor will vary somewhat with the size of the job, the type of work being done, and the administrative procedure of both of the parties.

4. Techniques and equipment . . . The trend of the past will probably continue. To us this seems to consist of an increase in size and competence of mechanical equipment used, the invention and introduction of new devices which cause the work to be done by machine and eliminate manual labor, and perhaps further improvement in the techniques of welding. In these several categories we have no particular items in mind, but we simply feel that with the passage of years these types of advances appear to occur.

5. Future problems . . . We do not see any particularly pressing problem which involves the company-contractor relationship. Assuming both parties are reasonable and are accustomed to doing business in a fair and equitable fashion there should be no problems. One problem, however, which may be considered as falling in this category in the field of which considerable advances have been made in recent years consists of the maintenance of good will toward both company and contractor on the part of persons whose lands are traversed by pipelines.

In times past, the rights of landowners have not always been as carefully preserved by either contractor or owner as those rights need to be preserved today. As years have passed, landowners have become much more astute in this regard and will not tolerate the abuses which have been common in the past. Most companies and contractors today recognize this and exert a strong mutual effort to preserve the landowners' good will, which is so essential to contractor and company.

Pipeline Contractors Tell . . .

"How we'd like to deal with oil and gas companies"

to us are just the same. Practically all pipeline contracts are bid on the basis of so much per linear foot of pipe laid. For use in making monthly or semi-monthly progress payments, this sum may be broken down for the various operations, but the total of these is the same as the lump sum. The linear-foot unit price contracted for should cover all phases of the construction except certain items where quantities cannot be specifically predetermined, such as casing, valves, weight clamps, and sacks. These last-mentioned items should be covered by separate unit prices, and we believe it better if these unit prices are established by the company prior to their receiving quotations covering the main-line construction.

3. Inspection . . . There should be one set of inspectors only. This is very important for good construction and a smooth-running job. Inspection should either be performed by the pipeline company or by an engineering company acting as agent for the pipeline company. In either case, the representative directly in charge of the inspection should be a qualified construction man, and one whom the company or engineering firm has complete confidence in so that there is no hesitancy in delegating to him the responsibility for obtaining a properly constructed pipeline. Under no condition should the inspection be undertaken by the contractor or contractor-engineer who is actually constructing the line.

4. Techniques and equipment . . . I believe the most significant advancement will be in improved equipment and the trend toward automatic welding.

5. Future problems. . . . The most important problem is to obtain the very best quality of pipeline construction possible. This applies on all lines, but particularly on high-pressure gas lines where faulty construction or faulty material can result in line failure, possibly creating a great disaster and much unfavorable publicity.

By D. R. Williams, Jr.
Vice President, Williams Brothers Co., Tulsa

IF limited to a few words to cover contractor-owner relationships, I would say that there is often too little relationship: the owner plans a program without considering what the contractors can offer, and the contractor bids without considering the owner's particular needs.

Oil and Gas Companies Tell . . .

"How we'd like to deal with pipeline contractors"

By B. D. Goodrich
Vice President and Chief Engineer, Texas Eastern Transmission Corp., Shreveport, La.

1. Contract bidding . . . There is nothing wrong with contract bidding provided the bids are carefully evaluated. Bidders should be eliminated who are not competent or have insufficient equipment to commit for the job and usually under bid to the detriment of themselves as well as the company. It is our policy to ask for and take bids from a few contractors whom we know to be competent, and after a study of their existing commitments decide that they have available adequate equipment to prosecute the project if they are the successful bidder. In no case do we automatically award to the lowest bid.

2. Types of contracts . . . The unit-bid contract is the best way to handle bidding. For each extra we require the contractor to submit a lump-sum price, with our option to authorize it on the lump-sum or on the unit costs.

3. Inspection . . . Inspection of construction is best handled by using a reputable engineering firm that has, or can employ, the qualified man power available in the numbers required. These groups are continually in contact with construction, and being abreast of new developments and techniques are better able to identify improper procedures and inferior workmanship. This also eliminates the need for the company employing large numbers of competent people on a temporary basis which is often difficult.

5. Future problems . . . One of the problems which may be considered pressing is the relationships between the lower echelons of the company and contractor organizations. With the continued growth of each group, assignment of responsibility to make decisions to lower levels has increased. It is possible that this might lead to critical situations that would deter progress on the job to greater extent than at present unless adequate training can be given to such personnel.

By a manager of a major pipeline company, Chicago

1. Contract bidding . . . Contractors too often bid a job without adequately studying the route and knowing restrictions. This results in bids either unrealistically high or low. It is admittedly sometimes the company's fault in not allowing sufficient time before bids must be received.

Pipeline Contractors Tell . . .

"How we'd like to deal with oil and gas companies"

In this country, competition determines the price of wheat and of pipelines as well. Although there is much similarity between the risks of the wheat farmer and those of the pipeline contractor, there is a market place for one, while for the other, engineering and planning must be done to prepare for competition. Unfortunately, some companies still contract for pipelines as if they were buying wheat. Since no pipeline contract can cover all the unexpected situations and provide equitably for public relations and operating considerations, there will always be the need for understanding between the owner company and the contractor. The company which does not prepare the basis for this understanding with prospective contractors before the bidding is merely postponing its problems, and usually some weeds will be sown in with the crop.

Pipelining is now a big business, and the owners of continuously expanding pipeline systems today depend more upon contractors than do other enterprises. If they want good contractors to be available with the proper equipment, it is becoming more necessary either to know the problems peculiar to pipeline contracting or to engage an engineering firm which does. Otherwise contractors with a highly variable backlog often may give circumstances more weight than cost estimates in their bids. While there may be a short-term advantage in keeping contractors guessing, the long-term result has been that the costs of idle time, freight, and move-in are still nullifying the advantages of new equipment and methods.

1. Contract bidding . . . Each season's work should be planned in advance if at all possible, with contractors selected for their suitability, knowledge of local conditions, and willingness to make a thorough analysis of the requirements. Time of starting, length of sections, unloading points, public relations, and special considerations should be worked out in detail at this time; truly comparable bids should then result.

2. Types of contracts . . . There is much to be said for a standardized contract form to provide uniform conditions in the industry, but no contract can define all the conditions peculiar to each job. In order to eliminate contingent allowances in a contractor's bid to cover unknown developments, provision for extra payment will always be needed. Again, extras can be minimized if the contractor fully knows the requirements in advance.

3. Inspection . . . Probably inspection is best done by permanent employes who will operate the system when built or by engineering firms whose men have regular employment, and least best by transient personnel recruited for each job.

No amount of inspection can insure the desired workmanship unless there is good faith and responsibility on both sides. In any event, there is need to improve inspection staffs to keep pace with the developments in construction.

4. Techniques and equipment . . . Pipelining now requires more equipment for the volume of work than any other form of construction. Unit laying costs, however, have not risen in proportion to labor and

Oil and Gas Companies Tell . . .

"How we'd like to deal with pipeline contractors"

2. Types of contracts . . . We prefer unit bidding for accounting purposes and the fact that the route of the line may have to be changed somewhat from the proposed route. We realize that extras may occur and generally ask the contractor to supply a list of men and equipment showing hourly rates which will apply in the event of extra work. Invoices for extra work must be approved by the project manager.

3. Inspectors . . . We generally furnish inspectors from some of our operating divisions. These men have many years of pipeline experience and report daily to the chief inspector. Our experience with contracted inspectors has been very limited and unsatisfactory.

4. Techniques and equipment . . . We feel that the trend toward automation will continue with much emphasis being placed on custody transfer of crude at lease tanks.

5. Future problems . . . One of the most pressing problems facing the company-contractor relationship is the need for better cooperation along the right-of-way in maintaining good relations with property owners. As right-of-way becomes more difficult and costly to obtain it is obvious that both company and contractor must exert a greater effort to maintain good will.

By J. Marston Linehan
President, Mid-Continent Pipe Line Co., Tulsa

1. Contract bidding . . . We have found contract bidding on the whole very satisfactory.

2. Types of contracts . . . We have preferred and have followed the practice of unit bidding whenever possible since we feel that we retain much better control over the job in this manner. Lump-sum bidding has been limited to such special projects as river crossings, station construction, and tank construction. We have tried to negotiate contracts in such a manner as to minimize work done over and above the bid items. On most contracts a certain amount of extra work is unavoidable, however. The basis for payment of such work should be the going hourly rates for the equipment and personnel involved and should be determined beforehand when possible.

3. Inspection . . . We prefer inspection by company personnel except for highly technical work such as radiographic-welding inspection. We feel that company-trained personnel are better qualified to interpret the

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equipment costs by reason of the increasing daily progress achieved. Manufacturers now make special equipment which contractors were accustomed to fabricate for themselves. The most room for advancement in the immediate future is in compactness and portability of construction equipment. In design—new uses for pipelines will see wood pulp, limestone, as well as coal and a number of ores shipped by pipeline.

5. Future problems . . . Greater prebidding attention by both company and contractor will have to be given if the benefits of new construction methods are to be gained. Even though all the steel pipe that can be made in the world for the next 5 years will be short of the requirements, there will be experienced men and suitable equipment available to install it if seasonable preparations can be made by the contractors.

By E. J. MAHONEY, JR., vice president, Bechtel Corp., San Francisco

5. Future problems . . . A pressing problem facing the company-contractor relationship in the future will be the ability of the company to award contracts far enough in advance of the actual starting date of construction to enable the contractor to properly allocate men and equipment to the construction site in order to efficiently execute a particular project.

Because of the significant technical and equipment advances, it has become possible for the contractor to appreciably increase production. The ability of the contractor to complete a project with greater speed than heretofore has paid big dividends to the company. This is true because the facilities being constructed can be put into service sooner and the resultant revenue can be realized at an early date.

The ability of the contractor to increase production has not been realized without certain problems which the company should be made aware of. These are listed as follows:

(a) The contractor must maintain an extensive working personnel throughout the entire year.

(b) The contractor necessarily has a large investment in specialized pipe-laying equipment which cannot be used for other general construction.

(c) The comparatively short working season in the northern three-quarters of the United States and all of Canada.

There are, of course, other problems facing the contractor, but if a company would take into consideration those listed above which must be met by the contractor, we feel certain that they would realize how much more efficiently the contractor could operate when given sufficient time to plan the season's work. This would enable the contractor to make appreciable savings in construction costs.

Of course, it must be realized that in many instances companies must depend on Federal Power Commission approval before they can authorize construction. However, in most situations of this kind, the contractor is generally agreeable to enter into a formal construction contract subject to Federal Power Commission approval. This is especially true where a company is looping its present system, because it is in

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specifications required by the contract and that they feel more responsible for their satisfactory execution.

4. Techniques and equipment . . . The most-significant technical and equipment advances in 1957-1958 will probably be in coating materials and in equipment and techniques for their applications. Continued improvement should also be made in automatic-custody-transfer equipment, plastic pipe, backfill sifters, and remote and automatic operating pump-station equipment.

5. Future problems . . . We do not foresee any major problems in the company-contractor relationship in the future.

By W. B. Haas
Superintendent of Pipelines, Northern Natural Gas Co., Omaha, Neb.

1. Contract bidding . . . A thorough understanding of what a contractor is expected to do is sometimes lacking. This means adequate drawings and sufficient information should be furnished by the company to a contractor.

2. Types of contracts . . . We would prefer the lump-sum type of contract because it minimizes the possibilities of extras due to minor changes in design. However, we have stayed with the unit-type contract so that our accounting department's property section could have an adequate breakdown of unit costs in conformance with the Federal Power Commission's accounting system. Extras under these circumstances should be authorized by field inspection personnel prior to the contractor proceeding with such work. Under extreme conditions, we have found it necessary to negotiate a fixed fee for the contractor and his equipment, to minimize the contractor's potential loss. We, of course, would pick up the labor costs and taxes.

3. Inspection . . . Inspection should be handled by competent regular company employes who are capable of taking over any phase of a contractor's operation. This means that the inspector is always available for consultation with the contractor's personnel, lending a more harmonious relationship. We have found that any job will move forward in an expeditious manner with a minimum of bickering and misunderstanding if, in the very beginning and before any work is started, the inspectors have a thorough understanding of how

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reality only asking for increased capacity to serve a market that has already been approved by this governmental regulatory body.

The final result of a contractor being able to plan his season's work a few months in advance would tend to make a happier relationship with the company as well as an appreciable saving in construction costs to each party.

By JAMES P. NEILL, partner and manager, J. P. Neill & Co., Dallas. President, 1957-1958, Pipe Line Contractors Association

1. Contract bidding . . . There is a growing recognition of the vital importance to the industry of contractors who are adequately prepared for prompt and efficient pipeline construction.

The advantage of this reservoir of skill, experience, and financial stability is lost when competent contractors get no more consideration in bidding an important job than is given to "hip-pocket" firms.

On many projects the pipeline company would be ahead by reducing the number of bidders to include only those with good reputations for performance. A reasonable number of contractors for bidding any job should not be more than six.

2. Types of contracts . . . I would also urge that pipeline companies give appropriate consideration to the judgment of contractors when their estimates differ from those of company engineers made in advance for unit bidding. An example of this is a project where certain contractors recognize that the actual amount of rock was only 25 per cent of the company engineers' estimates before bidding. Consequently the more realistic contractors lost out because of the requirement that they bid on four times as much rock as was necessary.

5. Future problems . . . Furthermore, it would be beneficial for pipeline companies to have more attention paid to the surveying of pipeline routes. In recent years there has been an increase in awkward locating of pipelines which could have been avoided if the engineers had had the collaboration of some of their own company pipeline men with long experience in the problems of construction and maintenance.

By SAMMY COLLINS, President, Collins Construction Co., Port Lavaca, Tex.

3. Inspections . . . The pipeline should be inspected by the people who are going to operate and maintain it. These people must have a thorough and complete knowledge of both the pipeline itself, the actual contract, and the financial arrangements.

The companies would be wise to use top-ranking personnel for inspection on submarine pipeline work. These people should sit in at the final negotiations conference prior to signing of the contract so they will have a better understanding of the contract intent.

4. Techniques and equipment . . . Great strides will be made in '57 and '58 in submarine pipelines. The large volume of work planned will necessitate rapid development of heretofore shelved ideas and equipment which could be used only on projects of great magnitude.

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the contractor's personnel intend to prosecute the job, the inspector then has full knowledge of how each of the contractor's foremen plans to function, and the foremen are fully aware of the inspector's requirements. For, after all, the inspectors should realize they are out to help the contractor and not hinder him, and the contractor's personnel should realize that the inspector is out on the work as a company representative to see that the contract is conformed with, and not to hinder the progress of the job.

By P. H. HUNTER, President, Interstate Oil Pipe Line Co., Shreveport, La.

NOTE: These comments are offered with the complete understanding that our past relationships with contractors have been cordial, and we are looking forward to continued excellent relations with contractors in the future. The views expressed herein are purely for constructive and helpful purposes for the pipeline industry and pipeline contractors.

1. Contract bidding . . . Competitive bidding by several contractors on any one construction project is an excellent way in which to get an equitable price. The selection of the right contractor and successful bidder should be based primarily on the price of the bid and the ability of the contractor to perform and do the job as agreed. We believe contract bidding is more desirable than contract negotiation.

2. Types of contracts . . . Unit bidding on all known projects to be done on any one job is best. This may be taken into a lump sum which gives you a unit job and also a lump-sum bid. Experience has taught that some contractors will bid high on a specific phase of a project and low on others while other contractors may bid just the opposite—high on what one contractor bid low on and low on what another contractor may bid high. Unit or footage bidding seems to be more equitable for both the company and the contractor. Unit bidding will faciliate the handling of changes (increases or decreases) in footage.

As to the proper handling of extras paid by the company on almost any job of any size there will be many unforeseen things or problems to arise that were not listed in the specifications. This particular work, of course, must be done and must be paid for. Any and all extra work competed should be discussed and agreed upon in advance, and the company's chief inspector and the contractor's responsible agent should sign work orders for these specific extra jobs.

3. Inspection . . . Experience has taught us that the use of capable company employes as inspectors is the most satisfactory way to handle inspection of construction projects. The very best employes from the standpoint of experience, personality, and their disposition to get along with others should be selected for inspection assignments. One employe should be set up as the head or chief inspector, and he should be furnished with sufficient experienced personnel as inspectors under his supervision for the different assignments of the job such as cutting of right-of-way, ditching, stringing, welding, etc.

(Continued in next column)

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Startling, high daily production figures will be the first result of prospective improved techniques.

A fourth dimension is extremely important in the laying of submarine pipelines. Application of the simple rules of probabilities, i.e. less exposure time, least possibility of hazardous happenings, time consumed in the laying of submarine pipelines, greatly affects the cost of doing the work since a large portion of the unit bid price is assigned to hazard contingency.

5. Future problems . . . In the field of submarine pipe laying, which is only a very small segment of the yearly volume of pipeline work, the problems are, we believe, more acute, since submarine pipelines are relatively in their infancy as compared to land pipelines.

There is a need for more company executives who know and understand the technical aspects of underwater work. This particular lack of knowledge often creates a real problem, since the submarine pipeline contractor who properly evaluates the work to be performed, has an extremely difficult time trying to explain all of the factors affecting his prices. Often the qualified submarine pipeline contractor must bid against an estimate made by company personnel who have little or no knowledge of submarine pipe laying.

Too often the submarine pipeline is designed without the services of a qualified expert. This practice results in costly errors, and higher contract prices. During design, the company should consult with one or more qualified contractors as to the method to be employed in construction, so that final design can be modified to suit the construction equipment to be used. Very often, large savings can be effected for both the owner and contractor.

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(Continued from first column)

4. Techniques and equipment . . . Automatic welding will be the most significant advancement in 1957-58.

5. Future problems . . . Contractors bidding on the job should look the job over very thoroughly and carefully and submit their bids on the basis of what it would cost them to do the job and make a reasonable profit. They should not be concerned about what they expect the other contractors to bid. Sometimes a contractor bids low on a job just to get a contract or to knock a competitor out of a job, and upon completion he finds that he has lost money. Many times he will then go to the company and endeavor to get the company to reimburse him for his loss.

In many instances this could lead to an area of controversy and a lot of lost time in investigations and discussions as to how the contractor lost money. In the opinion of the chief inspector the contractor could have done a better job of organizing and handling his work and spent less money on different phases of it, while the contractor thinks he has planned well, economically, and efficiently and has just lost money.

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The development of a closer and complete understanding between the inspector and the spread man on all phases of the project will always bring about a closer and better relationship between the company and the contractor.

Companies should try hard to give complete coverage of their jobs in the specifications that are sent out, and the contractor should have a thorough and complete understanding of the specifications before bidding.

The above five enumerated views are expressed for constructive purposes for both the company and contractor. Again we invite your attention to the prefaced remarks inserted over and above question No. 1.

By J. R. Polston
Vice President,
Service Pipe Line Co.,
Tulsa

1. Contract bidding . . . Nothing is wrong with contract bidding. Faulty construction and unforeseen extras result from: (1) Company failure to supply proper job description and construction specifications, and (2) failure on the part of contractor to familiarize himself with his company's job description and construction specifications or the terrain and physical features along the route of proposed line. The latter should be done before submitting a bid.

2. Types of contract . . . From a company standpoint, lump-sum bidding is preferable over unit bidding provided it is possible and practical to clearly define the job. However, on most pipeline projects, such unknowns as quantity and depth of rock, casing excavations, river and creek bank and bottom conditions, unforeseen extras, and changes after work commences, are of such magnitude that usually lump-sum bidding could result in heavy penalty to the company or the contractor.

The terms extras paid by the company is usually a misnomer. Under unit bidding, such extras ordinarily cover unknown quantities provided for in the unit bids and as such are legitimate costs, i.e., quantity of rock, extra depth ditch on irrigated fields, replacing tile in cultivated areas having drain tile, etc.

3. Inspection . . . Because of the multitude of considerations that must be complied with to conform to federal, state, county, local, and farm-owner regulations and requirements, it is almost imperative that the company supply either company or hired personnel as inspectors. We require our inspectors to assist the contractor as well as to see that the line is constructed according to specifications. The average contractor cannot afford to maintain personnel familiar with all of the alternatives that would comply with such requirements. In many instances, legitimate extras are authorized by the inspector.

5. Future problems . . . The most serious problems will probably be the same as in the past:

1. Failure to make progress. This is primarily due to lack of experienced personnel and lack of sufficient work equipment in first-class condition. These are the primary reasons that contractors lose money, and subsequently make requests for extras.

2. Contractor starting job before arrival of experienced personnel and necessary equipment. Many times a job is started before qualified supervisory personnel has been selected. This results in mistakes that cause misunderstanding between company and contractor. The most-important thing about any job is getting started right.

3. Failure of contractor to notify land owners or tenants before moving in, and not keeping the property, especially fences, in proper condition after moving in. This creates ill will between land owner or tenant which can continue on indefinitely and nearly always proves expensive to the company in future operation of the pipeline.

4. Failure of contractor to stay on right-of-way resulting in unnecessary property and crop damage.

5. Failure of contractor to make necessary clean up, such as removal of rock, debris, and skids, fill ruts, repair fences, dispose of oily rags, grease cans, etc.

6. Failure of contractors' insurance carrier to make prompt settlement of legitimate construction damage claims. Construction damage claims are the contractors' liability. Company pays crop damage.

7. Failure of contractor to plan and coordinate work schedule except on a day-to-day basis.

8. Failure to develop more efficient work methods and equipment.

By a pipeline company executive, East Texas

1. Contract bidding . . . Primarily there is very little wrong with contract bidding, provided the pipeline company knows what it expects in the way of construction and provided the pipeline contractors bidding on it also know what the company expects and are qualified to meet the company's expectations. One fallacy in contract bidding is that at times a contractor who is in dire need of work will bid a job low just in order to be assured of getting it and hoping that the elements and conditions will exist whereby he will make a profit from it.

When these conditions do not exist, he finds himself in the hole on a job and immediately expects to be bailed out by the pipeline company. This causes dissatisfaction on everyone's part. Also, I think that in numerous cases the pipeline companies do not stipulate well enough what they expect in their specifications and, in so doing, leave a contractor to do quite a bit of surmising and when he surmises wrong and it costs him money a disagreement again exists.

2. Types of contracts . . . There is actually very little difference between unit bidding and lump-sum bidding,

provided the same general contractor has the total job. However, if the pipeline company chooses to have several contractors on the same spread, it is readily understood that disagreements will exist between the contractors and harsh feelings result, causing loss of time and money. In my opinion, there should be no extras on a job, excluding clauses such as rock clauses, unless the pipeline company changes the route considerably or changes the conditions under which the contractor is expected to lay the pipe. In other words, when a pipeline company builds a line, it expects the contractor to build a complete, good, usable line for so many dollars which has been bid for it without having to itemize each pipeline crossed and each incidental extra that crops into the picture that cannot be determined before the job is started.

3. Inspection . . . In my opinion, the best type of inspection should be handled by people who are employes of the company laying the pipeline and who have had years of practical experience in the laying of pipe and who know what conditions exist on a job. If inspection is hired on the outside, there is always a question of doubt in the company's mind as to whether it has gotten a good inspection. On the other hand, in many instances companies send inexperienced inspectors on a job that cause the contractors a considerable amount of worry and expense.

4. Techniques and equipment . . . From this question, I do not know whether you mean construction or operation equipment. As far as operation equipment is concerned, I believe that meters and automation of stations and sampling will be the most significant technical advances. As far as equipment for construction is concerned, I do not have the least idea.

5. Future problems . . . One of the main problems, as I see it, is the fact that many contractors have gone into business since the last war, both big spreads and little spreads; and they cannot exist unless a considerable amount of construction and repair is maintained. Therefore, one of the most pressing problems is the fact that when a man becomes a pipeline contractor he must realize that he must meet competition among all the other contractors and do as good or better job in order to exist when things get tight. The pipeline companies cannot carry them when there is no work to be done.

Another big problem is the fact that land and rights-of-way for pipeline construction are becoming more and more difficult and expensive to secure each year. The pipeline contractor must remember that even though he is there for a short time and completes his work and leaves, the pipeline company has that condition to live with for the rest of its existence and the contractor's relationship with the landowner is of utmost importance to the pipeline company.

By a pipeline company executive, Oklahoma

1. Contract bidding . . . Nothing is wrong with contract bidding as long as reliable or reputable contractors are doing the bidding.

2. Types of contracts . . . Either lump-sum or unit price contract is satisfactory as long as the specifications clearly set out what is to be included in the lump-sum contract, or clearly define the units to be used in unit bidding.

Extras should be agreed upon, in writing, by both contractor and company, as to quantity and price at the time the extras are ordered by company. Such agreement should definitely not be put off until job is completed.

3. Inspection . . . Field construction inspection should be handled by qualified company personnel whose primary job should be to see that company gets the workmanship and output it should reasonably expect.

4. Techniques and equipment . . . Higher-yield-point steels with proper welding techniques.

5. Future problems . . . Both company and contractor are faced with bettering their relations with landowners on whose property pipelines are laid. Securing rights-of-way and paying damages is a growing problem.

More should be done toward standardizing specifications so that there will be better understanding between company and contractor.

By a pipeline company executive, Texas

Contract bidding . . . Nothing is wrong with contract bidding. However, in carrying out contract negotiations, certain procedures should be followed.

First, a company should accept bids only from a limited number of firms—around five or six. These firms should be thoroughly investigated to determine if they are competent pipeliners and have good equipment.

Second, specifications, maps and other documents should be thoroughly prepared so that there is little likelihood of any misunderstanding arising as to the way in which the work should be carried out.

Third, pipeline firms sould allow contractors adequate time to study the specifications thoroughly and carry out a preliminary investigation of the route along which the proposed line will pass.

Types of contracts . . . The fixed-fee turnkey type of contract appears to be the most favorable. Under such a contract, all proposed work should be clearly and specifically outlined.

In those instances where extra work is required, the payment for such "extras" should be based, primarily, on equipment and labor costs. However, the payment also should cover overhead expenses, plus a reasonable amount for the contractor's profit.

Inspection . . . The use of loyal, efficient and fair company personnel is recommended in all inspection work. Such employes are experienced pipeliners in their own right.

Inexperienced inspection teams, in many instances, have unnecessarily slowed up or have completely halted pipeline projects with a resulting cost of thousands of dollars to the contractor.

Through the use of competent company personnel, inspections are more likely to be conducted in a reliable but fair manner. And consequently, the end result is more likely to be a completed pipeline which will remain in operation for the maximum time for which it was intended. This obviously would work to the benefit of both the pipeline firm and the contractor who constructed the line.

Techniques and equipment . . . In the technical line, it appears that the industry will develop large-diameter

pipelines through which solids can be transmitted efficiently and economically. These solids might include coal and iron ore as well as other minerals.

In developing such lines, the steel industry likely will perfect and manufacture pipe with even higher tensile strength. Such lines would make it possible to move a greater volume of goods under high pressure.

In the equipment field, it is likely that manufacturers may succeed in perfecting a pattern-back filler machine which will make it possible to completely pad and backfill a ditch in one operation.

In this connection, it is felt that the industry needs to develop a more efficient and economical way of handling rock in various phases of pipeline construction —from excavating to padding to backfilling.

A relatively large percentage of the total construction cost per foot at the present time is spent on working with rock.

One way of working toward a solution of this problem might be the formation of an industry-wide research and development committee comprised of engineering representatives from each of the transmission firms. Such a project could be jointly financed by all of the participating firms.

Through such a committee, the industry could work toward a solution of the problem and thus possibly reduce their operating costs by a substantial margin.

By a pipeline manager, Chicago

1. Contract bidding . . . In general, the bids received by our company are acceptable. The company awards its work primarily on a competitive basis using either a lump-sum or a unit-price basis type of contract. In rare instances, there seems to be some indication that contractors fail to read the specifications carefully, resulting in differences during the progress of the work.

2. Types of contract . . . Under unit bidding or lump-sum contracts, specifications are drawn up and submitted to various contractors for bids. The company selects a representative group of contractors in the existing market and has all the contractors bid on the same bid documents. It has been our experience that unit bids and lump-sum contracts are relatively simple to control after the contract has been formalized.

With respect to cost-plus contracts; they are lacking in self-policy and incentive for efficiency, we require various controls and constant detailed auditing to determine that our company pays only cost of labor, materials and equipment used on the job; and to ascertain that payments are in accordance with the terms of the contract.

With respect to extra work, we provide in our firm-price contracts that extra work shall be performed only if prior to its commencement, requests have been made in writing by our field agent. The cost of each job of extra work is determined primarily upon an agreed lump sum or a definite amount per unit. If no agreement can be reached in respect to payment, the contractor is compensated in accordance with job costs which are outlined in detail in our contracts. The payment for extra work is incorporated in the written authorization to the contractor to preclude any possibilities of difference once work is commenced.

Care is exercised when extra work is performed under job cost so that no duplication of charges which may be covered by the firm price of the contract are allowed.

3. Inspection . . . We believe that all inspection of materials and new construction should be performed by our own permanent company employes, wherever possible. Since most companies are not engaged in construction continuously, it is not possible to develop and maintain an adequate force to inspect such items as pipe in the process of manufacture. It is therefore necessary to retain engineering firms specializing in this type of inspection.

All pipeline-construction inspection within our company is performed by permanent company employes under the general direction of the chief engineer. Field inspection is under the direction of a chief inspector, whose permanent assignment is normally an engineer or superintendent in the operating department. Other inspection personnel are drawn from the company's maintenance organization. Compressor-station and meter-station construction is always under the supervision of a company engineer whose permanent position is in the company's engineering or operations division.

Radiographic inspection of welding or pipe, of course, must of necessity be done by an engineering firm skilled in the techniques and possessing equipment for such work. Inspection of items in compressor stations such as concrete, macadam roadways, or other specialty items might be supplemented by advise from experts in that particular field.

Inspection of equipment installation is supplemented by the manufacturers of the equipment. On any phase of construction where special circumstances or problems exist, or where our own experience is limited, we do not hesitate to call in experts in that particular field for consultation.

4. Techniques and equipment . . . Probably the most significant technical advance in pipelining in 1957-58 will be the trend toward the so-called automation or automatic or semiautomatic and unattended compressor stations and measurement stations. Probably the most significant advance in equipment may be the further development of high-speed gas-fired turbines for the compression of natural gas. Development of new means for adequate storage of natural gas at points near the market will have top priority during this period.

Also, a significant factor in both technical and equipment advances is the constant and steady improvement of practically every method and device used in the construction and operation of a pipeline. No phase of pipelining has remained dormant, but has maintained a level of development or improvement commensurate with the nation's fastest growing industry.

5. Future problems . . . The problems facing the company-contractor relationship in the future will be much the same as at present. The company must receive the completed facility within the time limit as set up on the predetermined schedule and yet maintain high standards in quality and workmanship. The contractor must be allowed a fair return on his time and investment. Pipeline construction has developed within the last decade to a point where the old-time pipeliner can no longer cope with the problems involved in engineered pipelines.

Today's and tomorrow's inspection personnel and contractor's spread personnel are not only skilled in the methods of construction, but must also have a knowledge of engineering codes; must develop and maintain accurate accounting and cost records; must have an intimate knowledge of the national, state and, local laws as they relate to the job; must be skilled in the

handling of subordinate personnel; must negotiate union contracts or agreements and mediate differences; must develop and maintain an adequate safety program; must promote satisfactory public relations in the work area; must be skilled in the selection, maintenance, and operation of equipment which might cost well over a million dollars on a single pipeline spread; must develop and maintain material-delivery schedules which are comparable to a major problem in military logistics; must move the job ahead on schedule and within the contract cost; and last but by no means least important —to cooperate fully with each other and be tolerant of the other's problems.

By a pipeline consultant, Tulsa

1. Contract bidding . . . Some of the faults in contract bids are:

(a) Including contractors who have a reputation for low bidding for the purpose of influencing the bids of other contractors.

(b) Neglect to limit the bidders to qualified contractors.

(c) Low bids for the purpose of obtaining a job with the hope that sufficient money can be obtained in extras and by negotiations to make a marginal profit.

(d) Often pipeline companies do not supply contractors with sufficient information. They do not allow them sufficient time to make a sound estimate of the cost of the job.

(e) Acceptance of bids which are known to the company to be below cost results in unpleasant relations and injury to both the contractor and the pipeline company.

2. Types of contracts . . . The unit price per foot of construction is a sound and reasonable basis for a contract. Specifications and contracts should provide for foreseeable extras at a unit cost. Unforeseeable extra work should be done only when authorized by a proper representative of the company, and a record of the contractor's costs for performing the work should be made and approved at the time the work is done. Contractors should provide rock clauses, and the company should provide the contractor with better information with respect to the existence and the nature of rock along the right-of-way. Surveys should explore for rock.

3. Inspection . . . For established companies it is best to have the inspection done by their regular employes who have been trained in the company's practices. Usually, these inspectors are experienced maintenance and construction foremen. Company inspectors should be chosen for their fairness to the company and to the contractor. Before a job is undertaken there should be a meeting of the company's inspectors and the contractor's representatives to review the specifications and make certain that they are understood in advance of undertaking the work. At such a meeting there should be a firm understanding that the representatives of both parties must be fair and equitable in their duties.

4. Techniques and equipment . . . There will be a continuation in the trend to the use of large-diameter pipe, valves, fittings and, consequently, larger and heavier construction equipment. Also, there will be a continuation of a trend to mobile offices, warehouses, and living quarters, for use in sparsely populated regions.

5. Future problems . . . More detailed information should be provided in the specifications for special phases of the construction. A better understanding of the contracts is needed in advance of the performance of the work. Bidders should be limited to contractors that qualify in advance for the job. Bids that are known to be below cost should be avoided.

. . . and in conclusion

Consultant reminds: Cheapest bid may not be best

by Oscar Wolfe

ALL of us have often heard the tired cliche that "competition is the life of trade!" In some of the commercial spheres this saying may be perfectly true, but is it really so when applied to wide-open bidding for pipeline-construction contracts? If we take the experience of those who have had to deal with contract negotiations, it will be found that many of them, at one time or another, have been faced with the dilemma of reluctantly awarding the work to a low bidder when instinct and previous records dictated a different choice.

Acceptance of such a bid indeed may not be the lowest in the end. It follows then that true economy and real saving in construction cost can best be achieved by the elimination of insincere and doubtful bidders and by awarding the work to the best offer out of the group representing competent organizations of known integrity and with the ability, staff, and equipment for doing the job on time and in a manner satisfactory to the owner. So, if competition there must be, it is well to observe that:

1. Owner's specifications should be sufficiently detailed and of such comprehension that excessive extras for special construction are held to a minimum.

2. Owner sets up exacting procedure for authorization of all extra-work items on the basis of cost estimates which are to be submitted for owner's approval at the time the job order is authorized.

3. Owner qualifies prospective bidders with respect to ability to perform the work to his satisfaction and limit the invitations to bid to organizations in this qualified list. Such a group should be large enough to insure true competition.

The foregoing observations are intended to apply primarily to domestic contracts. A somewhat different situation arises for work in foreign countries. There, the contractor's problems become more complicated and the risks to be assumed by him much greater.

For work scheduled in less-developed countries, the contractor has to cope with many unaccustomed difficulties.

First there is the great problem of logistics by which his working forces are to be supplied with the thousand and one items for keeping his crews and equipment in operation. Skilled technicians must be housed, adequately fed, and guarded against disease. This is no mean undertaking if these men are to be kept in a state of mind conducive to best construction progress. Secondary labor from among the people in the country must similarly be taken care of although on a somewhat different level.

The combined effect of all of these factors is difficult to estimate beforehand and in definite dollar terms. Thus, a contractor, when bidding competitively under such conditions, is faced with many unknowns. If he means to stay in business his bid must be high enough so as to leave no doubt in his own mind that all of the unknowns can be taken care of. Even then it is a great gamble and few contractors can or will assume such risks, except the few who are versed in foreign work and may already be established in the country in question.

It is for these reasons that construction awards for work in foreign contracts often are made on a negotiated basis. This lessens the risk to contractors and, at the same time, benefits the owner company to the extent that the work is done at actual cost plus a legitimate profit to the contractor rather than at fixed prices which must be inordinately high.

Under such cost-plus fixed-fee agreements the contractor virtually operates on the owner's money for all reimbursable cost items. He cannot, therefore, expect to have the same freedom as to manpower, equipment strength, and other required facilities which he would exercise under a firm-price contract, where the how of doing the work is definitely within the contractor's province. A reimbursable cost-plus fixed-fee agreement for pipeline construction in foreign countries therefore should stipulate that:

1. Contractor's field organization of skilled operators as well as ordinary labor are kept within the bounds of good practice for the conditions of the job in question.

2. Personnel turnover involving overseas travel to and from the job is to be held to a minimum and, when necessary, must have the company's personnel department approval.

3. Contractor's foreign camps, messes, hospitals, shops, and supply depots constructed on a reimbursable basis must, in general, have owner's approval as to prospective cost.

4. Compensation rates for all classes of skilled and unskilled labor used by contractor are to be in accordance with an approved schedule.

5. Rental rates for all classes of equipment and vehicles used by contractor on the job must conform to an approved schedule.

As stated before, contractor's field-construction costs are on a reimbursable basis to which is added a fixed fee for overhead and profit. Such an arrangement has a basic fault, however, in that there is no inherent incentive for the contractor to do the job in the most-economical manner. This means that the selection of an organization known for its integrity is more important than cost. Just the same, an incentive clause, as outlined below, will do much to stimulate aggressive prosecution of the job in the contractor's organization.

In substance, this clause might take the following form:

(a) The cost of the projected work is estimated by joint effort between the owner and contractor. Unforeseen contingencies are to be provided for, by means of a maximum upper limit for the cost of contractor's work. Then if the actual cost of the work exceeds the upper limit:

(b) Both the owner and the contractor will each absorb 50 per cent of such overexpenditure, the contractor's position to be deducted from his profit fee.

On the other hand, in the event of underexpenditure as compared with the jointly prepared estimate, the amount of the underexpenditure will accrue:

(c) Fifty per cent to the owner and 50 per cent to the contractor.

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Directory of Pipeline Contractors

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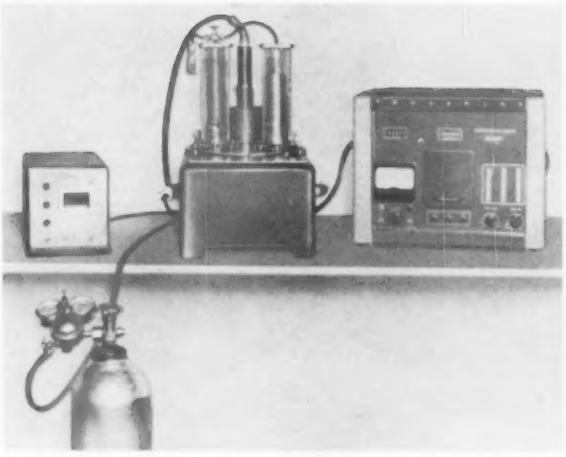
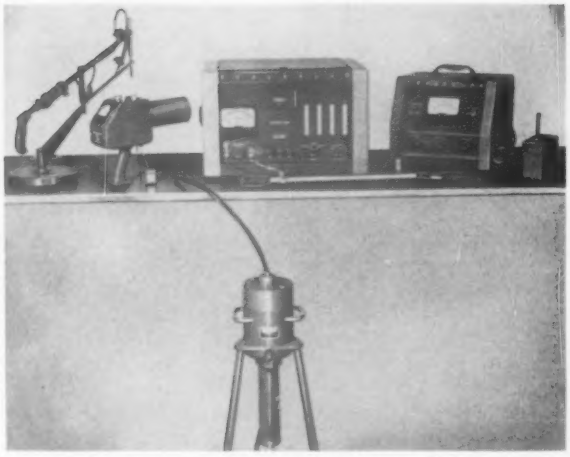


AUTOMATIC CARBON-14 LABORATORY, showing, from left to right along counter, printing timer, automatic flow counter with samples visible in the columns, the scaler, and partially seen at lower left, the counting case. Fig. 1.



LIQUID GAMMA SAMPLE LABORATORY, showing pipetting device, radiation survey meter, scaler with handling tongs, laboratory area monitor, dosimeter and charger, and, below, well scintillation detector and shield. Fig. 3.

Radioisotopes in Refining—5

Are You Overlooking Nuclear Radiation?

It's a valuable tool, and the investment isn't prohibitive

by Frank H. Low

THE acceptance by industry of the application of radioactivity to the solution of its problems has in many instances been pioneered by the petroleum industry. However, even in this field, lack of training or information has retarded the quick utilization of radioisotope techniques developed by universities and Atomic Energy Commission facilities. This article indicates the problem of obtaining adequate information is not nearly as great as might be expected in such a new and specialized field as the application of nuclear radiation, and the required investment is by no means prohibitive.

Author is special assistant to the general manager, Tracerlab, Inc., Boston. Paper presented before The Tracerlab symposium on the application of radioactivity in petroleum research and refinery operations, Boston, October 24-26, 1956.

The first step in radioisotope utilization is to become familiar with the currently employed applications in your particular field. Such information can be obtained from A.E.C. publications, from special magazines such as Nucleonics, from regular petroleum trade publications which have started to carry articles on this subject, or by attending meetings or symposiums on the subject.

Once a particular application has been found which appears to be interesting, two further questions arise. First, it may be necessary to receive proper training in the specialized radioisotope techniques for the personnel who will be involved in the project, and secondly, an estimate will have to be made of the required equipment.

Training . . . Facilities for training have increased greatly in the last few years, and courses can now be taken by industrial personnel at a number of institutions besides the long established Oak Ridge Institute for Nuclear

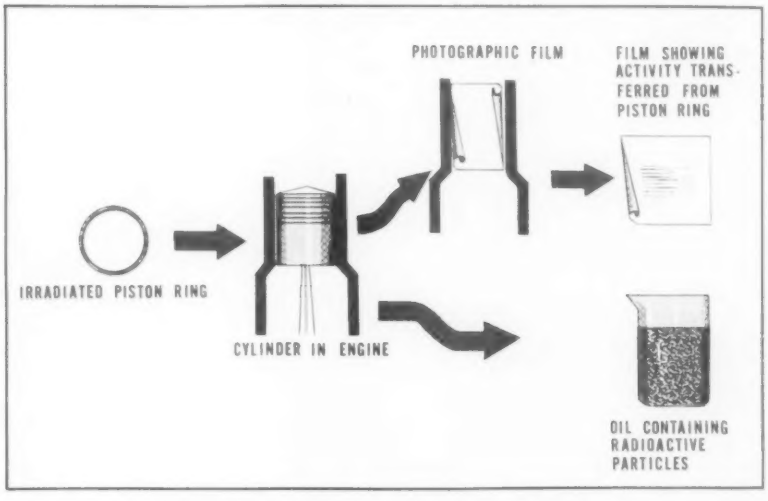
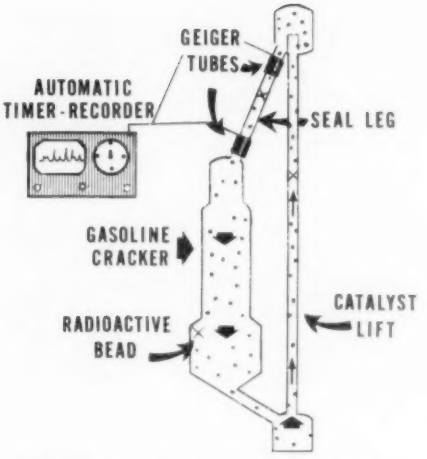


DIAGRAM of radioactive piston-ring-wear test. Fig. 2.

PULSE HEIGHT ANALYZER and scaler with manual sample changer and detector at right. Fig. 4.



SCHEMATIC DIAGRAM showing control of catalyst flow rate using radioactive beads. Fig. 6.

Studies. At the institute a basic 4-week course in radioisotope technique is given several times a year for a medium-sized group at a low fee.

Similar types of courses are offered at a number of universities, and more specialized, intensive courses covering primarily specific applications of interest to a small group of participants are available at a somewhat greater cost at commercial laboratories. For exemple, Tracerlab offers 1 and 2-week courses of this latter type at its facilities here in Boston as well as in Richmond, Calif., and Houston, Tex.

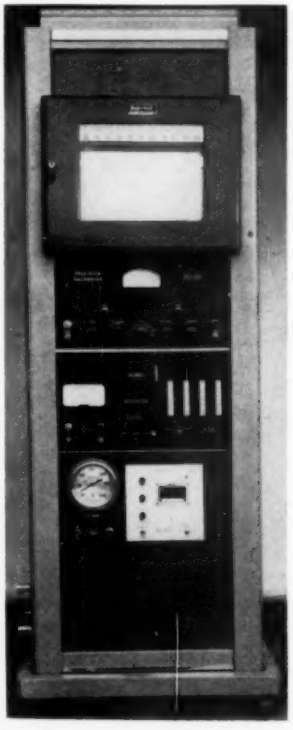
These courses are arranged to meet the convenience of the participants, and the course material is specially designed each time to conform to their interests and requirements.

Thus, training for all the people who are likely to be involved in the radioisotope part of a particular project can generally be obtained in a period of at most 1 month at a cost of at most $1,500.

Equipment estimate . . . The next step then is to determine what is necessary in physically establishing the radioisotope facility. A considerable variety of equipment is available for use with radioactive isotopes. The following basic considerations must enter into the choice of the required items:

1. The isotope or isotopes to be used.
2. The desired accuracy.
3. The level of radioactivity which will be handled.
4. The amount of work which will be done.
5. The long range plans.

The first of these determines the general type of equipment which will be needed to work with the kind and energy of radiation emitted by the active material. The second narrows the choice of equipment to the type which can give the desired degree of accuracy. The third is the deciding factor in the selection of monitoring and personnel equipment. The fourth indicates the need or lack of need for automatic equipment, and the last calls for a review of the decisions based on the first four points in the light of the possible, and frequently likely, expansion of the isotope work after the laboratory has been established. I shall try to apply those criteria to four more or less typical applications of radioactivity in the research and refinery operations of the petroleum industry.



PACKAGED engine-wear-rate analyzer as used in laboratory wear-rate studies. Fig. 5.

Reaction Studies

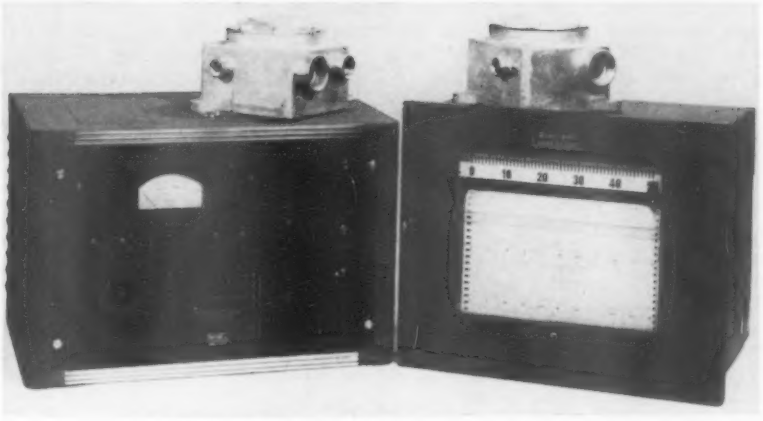
First, I shall take the case of experimental work involving the study of a complex organic compound in a number of chemical reactions. Here the choice of the isotope is influenced by the following factors:

1. The presence of the nonradioactive form of the element in the material.
2. The desirability of a reasonably long half-life.
3. The desirability of easily measurable yet relatively nondangerous radiation.

The first factor is an essential requirement if the presence of the radioactive isotope is not to alter the action of the compound under study. The second factor makes it possible to carry on studies over a reasonable period of time without laborious corrections for decay, and the last factor simplifies and reduces the equipment requirements.

Carbon 14 . . . It so happens that under those circumstances carbon 14 with a half-life of over 5,000 years and a pure beta activity is an excellent choice since carbon is an integral part of all organic molecules. Having made this choice, we must next determine the form in which this material will be obtained. Barium carbonate containing carbon 14 can be purchased from Oak Ridge and synthesized into the desired compound, or a ready-made synthesized compound might be purchased from a commercial firm, either from a list of stock compounds or on special order.

Let us assume that in this case the desired compound is not commercially



CATALYST-FLOW-RATE COMPUTER with recorder. Fig. 7.

available, but that it can be readily prepared from an available precursor. This means that special laboratory facilities will be required for the synthesis, but these consist only of an air-tight fume hood and more or less standard glassware. Incidentally, the cost of the radioactive precursor can be estimated to be about $500 for a given series of experiments.

Techniques . . . If we next assume that a very high degree of accuracy is desired, we can immediately limit the choice of counting equipment to either a windowless flow counter, a liquid scintillation counter, or a gas counter since the weak beta rays of carbon 14 can be efficiently measured only by putting the active material into the counting chamber, the counting phosphor, or the counting gas.

Of these three techniques, the first is the most straightforward and the most widely used if a sufficient amount of activity is available. For our purposes, I shall assume that we can obtain reasonably active samples and hence we shall choose a windowless flow counter. With this, we need a scaler for the actual counting and such accessories as a reference source for standardization, planchets, etc. (Fig. 1).

If the amount of radioactivity work to be done is not too great, we can complete this selection of equipment by deciding that this instrumentation need not be automatic. The only safety items required, besides the previously mentioned hood, are a laboratory monitor to check for contamination and to keep track of the background level, and film badges for the personnel who will handle the isotope. This is a good legal protective policy even for carbon 14 which does not show on the film.

Long range plans . . . If those call for a likely eventual expansion of the work of this laboratory, then one additional specification should enter into this choice of equipment. While automatic instrumentation does not appear justified at this time, at least the scaler should be chosen. It can be used eventually in conjunction with automatic accessories.

The total equipment cost, exclusive of the hood and glassware which are probably available in the laboratory, is about $2,000.

Piston Wear

Another pertinent example would be routine testing of lubricating oils in piston-wear measurements where the wear rate is determined by measuring the amount of radioactive material deposited in the lubricating oil (Fig. 2).

In this case, there is no choice of isotopes since the piston itself is irradiated in a reactor and most of its constituents are made radioactive. Likewise, there is no need for synthesis facilities. Some of the metals used in a piston emit gamma rays after irradiation, and the piston reaches a reasonably high level of activity. Therefore, the personnel must be protected not only with a laboratory monitor and with film badges, but also with a higher level survey meter, remote handling tools, pocket dosimeters for regular checking of accumulated radiation, and storage facilities for the active piston.

The simplest counting technique applicable to this experiment is the use of a well type of scintillation detector which will measure the gamma radiation from a 5-cc. sample. Alternatively, a geiger-tube beta detector could be used if the samples proved to be extremely weak in activity. Either detector would be connected to a scaler, preferably one with a built-in clock and preset count provisions for uniform statistical accuracy (Fig. 3).

Since this is essentially a test installation, the system probably will remain relatively unchanged for some time. Therefore, this device need not be modified by long range considerations. The total cost of the discussed equipment is about $3,000.

If for some reason the relative wear of two parts of the same piston made of different metals is of interest, the use of a window type of pulse height analyzer in the system, along with the substitution of a slightly different detector, will yield this information at an additional cost of about $1,000 (Fig. 4).

If an automatic installation is required, a custom-built unit could be obtained which gives a continuous

DETERMINING DENSITY of fluid catalyst with rate meter and recorder at left, and multi-port shield above detector which lies under pipe at right. Fig. 8.

reading of the counting rate on a recorder and/or on a printed tape. Such an installation would cost from two to three times as much as the sinple set-up described previously (Fig. 5).

Catalyst Flow

For the next example, let us move from the laboratory to the refinery and consider the determination of catalyst flow rates in a TCC unit. Here it is possible to add a small number of radioactive beads to the catalyst beads and determine the circulation rate by timing the passage of the individual beads from one detector to another one located further down the return pipe (Fig. 6).

The isotope requirements here are half-life comparable to the lifetime of the catalyst beads, gamma emission in order to pass through the pipe, and chemical stability in the presence of the chemical reactions taking place in the unit.

Zirconium 65 meets those requirements, and a charge of beads which will last for several months is commercially available for about $150. If the isotope is purchased in this form, only handling tools, a storage container, a survey meter, film badges, and dosimeters are required for personnel protection.

The applicable instrumentation consists of two detectors, as previously mentioned, or rather two sets of detectors for greater efficiency and reliability, preamplifiers, a ratemeter, a flow rate computer, and a recorder. This is a packaged installation which costs about $4,500 (Fig. 7).

Fluid Catalyst Density

For a final example we can take a slightly different version of the previous problem, namely that of determining the density of fluid catalyst. This is done by placing a source of radiation on one side of the pipe and a detector on the other side, and observing the amount of radiation transmitted. The source must obviously be a gamma emitter, must be reasonably energetic, and must have a fairly long half-life. Cobalt 60 is the most common and undoubtedly the most suitable choice. The required amount is dependent on the size of the pipe and the density of the material (Fig. 8).

If this is to be a fixed installation, the active material would be fixed in a combined shield and holder. However, if the unit is to be moveable, as is more often the case, the previously mentioned long range plans may indicate that different sizes of pipe may have to be measured. In that case, it is desirable to choose a source suitable for the largest pipe and to house it in a portable container which has openings with a choice of absorbers to reduce the source strength to the desired level.

With such a source, it is necessary to have on hand only a personnel protection survey meter and film badges. For the detector, a gamma scintillation counter and ratemeter with recorder would normally be used. A typical complete installation might cost about $3,000.

Many other examples could be cited along this line, most of which would further underscore the fact that the problems and cost involved in establishing a radioisotope facility are hardly prohibitive. The further development of the facility is likewise usually a reasonable undertaking, one which becomes self-evident when the benefits of the installation are realized.

Most frequently, it takes the form of the addition of automatic equipment, the substitution of more sensitive detectors, the use of more selective measuring techniques, or the application of other isotopes.

Further development frequently requires that a group of equipment which had been intended for various uses must be devoted to one routine application and an additional setup must be purchased for the general work.

However, the development phase is generally greatly simplified by the fact that competent personnel within the organization can make the necessary choices themselves. Thus, only the first plunge really appears venturesome, and even that is not as complicated or costly an undertaking as is sometimes supposed.

Correction

In our article on the W. P. R. A. regional meeting at El Dorado, Ark., "Refiners Seek Answers to Puzzlers," we inadvertently listed the company affiliation of Jack Eppard as Sunray Mid-Continent. Actually, Eppard is chief process engineer for D-X Sunray Oil Co. at the company's Duncan, Okla., refinery.

BOOKS

MANAGEMENT LEADER'S MANUAL. 199 pp., fabricoid cover, $3.50.

Purpose of this manual is to bring to more people some of the information available on human relations and industry operating problems. Included are hundreds of studies that have been gathered by the A.M.A., all bearing upon a common theme—how to improve relations with groups and individuals. Principal headings are: Management Leadership in a Democracy, the Management Leader's Human-Relations Responsibilities, Interviewing and Counseling Techniques, Progressive Training Techniques, Tests for the Management Leader.

SUBSURFACE COMPLETION DATA OF WELLS DRILLED FOR OIL AND GAS DURING 1955, compiled by Roy W. Foster and Constance F. Schilling. Published by State Bureau of Mines and Mineral Resources, New Mexico Institute of Mining and Technology, Socorro, N. M., 58 pp., available free of charge upon request.

The New Mexico State Bureau of Mines and Mineral Resources has published a list of all wells drilled in the state during the year 1955. The summary gives the operator, well location, total depth, and completion data. Both wildcat and field wells are listed.

GEOLOGY OF NORTHEASTERN OSAGE COUNTY, OKLAHOMA, Circular 40, by W. A. Tanner. Published by the Oklahoma Geological Survey, University of Oklahoma, Norman, Okla. 76 pp., $1.50 paper, $2.25 cloth.

The Oklahoma Geological Survey has recently published a study of the surface geology of northeastern Osage County. Included are several cross-sections as well as a detailed geologic map of the county based on surface outcrops.

Note: The Oil and Gas Journal maintains a book department. Write to the READER SERVICE DEPARTMENT, P. O. Box 1260, Tulsa 1, for copies of the book list. Often books reviewed here may be purchased from this source.

Nelson Refinery Construction Index

Appears in the Engineering Section in the first issue each month.

Compiled by W. L. Nelson, petroleum refinery consultant, Tulsa.

The Index was explained July 7, 1952 (page 105) as well as the Indexes of Individual Items of Equipment that appear on the Cost-imating page in the first issues of the months of January, April, July, and October.

Index (1946 = 100)

	1949	1952	1953	1954	1955	Oct. 1956
Pumps, compressors, etc.	135.9	155.6	162.5	166.5	172.2	198.8
Electrical machinery	130.9	152.4	156.4	160.0	162.5	181.4
Internal-combustion engines	124.8	146.5	148.1	150.5	153.2	166.9
Instruments	123.1	146.2	151.8	154.6	162.9	181.9
Heat exchangers	133.0	165.8	174.9	171.7	156.8	197.8
Miscellaneous equipment average	*121.6	153.3	158.8	160.7	161.5	185.4
Materials component	143.6	164.3	172.4	174.6	176.1	196.9
Labor component	137.1	163.1	174.2	183.3	189.6	201.2
Nelson construction index	139.7	163.6	173.5	179.8	184.2	199.4

*Used in computing the Nelson Index until April 1952. This is slightly different from the average of the Miscellaneous Equipment Items shown above.

ELEMENTS OF FIELD PROCESSING—27

Derivation of Flow Equation for Liquids

by Dr. John M. Campbell

A SATISFACTORY equation for the prediction of fluid-flow characteristics is best derived from the first law of thermodynamics which in general terms states the indestructibility of mass and energy, or their equivalent. This then enables one to write an energy balance around any two points in a flow system.

Such a general system is shown in Fig. 1, which embodies all of the changes possible in the system. The balance may be written between any two points in the system but the general balance between points (1) and (2) would be:

$$U_1 + P_1V_1 + X_1 + \frac{v_1^2}{2g} + q - w = U_2 + P_2V_2 + X_2 + \frac{v_2^2}{2g} \quad (1)$$

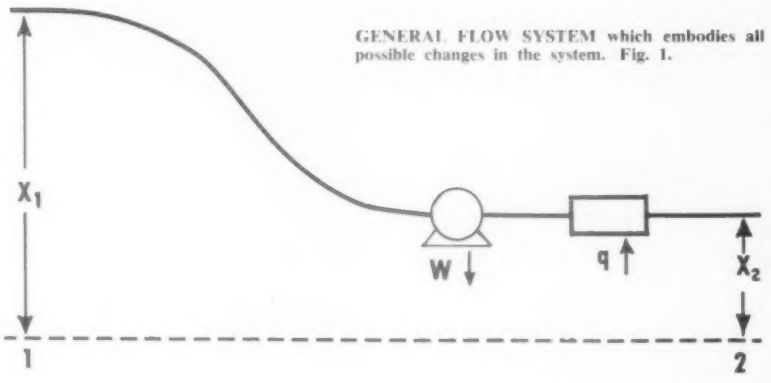
or $\Delta U + \Delta(PV) + \Delta X + \frac{v_2^2 - v_1^2}{2g} = q - w \quad (2)$

Where:

- U = internal energy which includes all energy present including heat, electrical, chemical, surface, etc.
- P = pressure
- V = volume or specific volume
- X = elevation above an arbitrary plane
- v = velocity in conduit
- g = gravitational constant
- q = heat added or lost by system (plus if gained, minus if lost)
- W = work done by system (plus if done by system, minus if done by surroundings on system)

The fluid entering at (1) has an internal energy U_1 which is the result of previous energy obtained. In addition a certain amount of PV work must be done to get the fluid to flow past point (1), i.e., the energy necessary for it to flow. This fluid also possesses potential energy X_1, above the datum plane, and kinetic energy $v_1^2/2g$.

Author is chairman, School of Petroleum Engineering, University of Oklahoma, Norman.



GENERAL FLOW SYSTEM which embodies all possible changes in the system. Fig. 1.

The fluid leaving at point (2) possesses the same forms of energy which are different in amount from those at (1) by the amount of heat and work gained or lost. Equation 2 is a convenient form of the final balance since normal data available are relative.

Another form of Equation 2 is obtained by remembering that the enthalpy H = U + PV. Therefore:

$$\Delta H = \Delta U + \Delta(PV) \quad (3)$$

Substituting (3) into (2) yields:

$$\Delta H + \Delta X + \frac{v_2^2 - v_1^2}{2g} = q - W \quad (4)$$

which is a convenient form for use when enthalpy data are available.

If chemical, electrical and surface energy changes are assumed negligible in the pipeline:

$$\Delta U = \int TdS - \int PdV \quad (5)$$

where S is the entropy and T the absolute temperature. Furthermore:

$$q = \int TdS - W_f \quad (6)$$

where W_f is the total of the irreversible effects present in the flow system. The term $\Delta(PV)$ is also equivalent to $\int VdP + \int PdV$. Substituting these terms into Equation 2 yields:

$$\int VdP + \Delta X + \frac{v_2^2 - v_1^2}{2g} = -W_f - W \quad (7)$$

Equation 7 is as far as one can go using thermodynamics alone for it provides no way of solving for the term W_f.

Lost work . . . The total irreversible effects W_f are usually attributed to friction. The work done in overcoming friction through a distance dL is proportional to the surface in contact with the fluid, approximately proportional to the square of the velocity and proportional to the fluid density. By including a proportionality constant f, the equation may be written:

$$\text{frictional resistance} = (f)\,(dL)\,(\pi D)\,(v^2/2g)\,(\rho) \quad (8)$$

The weight of fluid in the pipe is the length dL multiplied by the cross-sectional area and the fluid density. Any frictional work would be represented by the frictional resistance moved through distance dL. Combining these concepts into Equation 8 then yields dW_f:

$$dW_f = \frac{(f)\,(dL)\,(\pi D)\,(v^2/2g)\,(\rho)\,(dL)}{(\pi/4\,D^2)\,(\rho)\,(dL)} \quad (9)$$

Simplifying:

$$dW_f = \frac{2fv^2dL}{gD} \quad (10)$$

which integrated between the limits of 0 to W_f and 0 to L gives:

$$W_f = \frac{2fLv^2}{gD} \qquad (11)$$

Combination of Equations 7 and 11 then gives:

$$\int VdP + \Delta X + \frac{v_2^2 - v_1^2}{2g} = -\frac{2fLv^2}{gD} - W \qquad (12)$$

which is the basic equation for liquid flow.

For a line of constant cross-sectional area, flowing substantially incompressible fluid, containing no pumps or turbines, Equation 12 would simplify to:

$$V(P_2 - P_1) = -\frac{2fLv^2}{gD} - \Delta X \qquad (13)$$

since $V = 1/\rho$ and the change in velocity in negligible.

$$\frac{\Delta P}{\rho} = -\frac{\Delta P_f}{\rho} - \Delta X \qquad (14)$$

Where:

$$\frac{\Delta P_f}{\rho} = \frac{2fLv^2}{gD} = \text{pressure drop due to friction} \qquad (15)$$

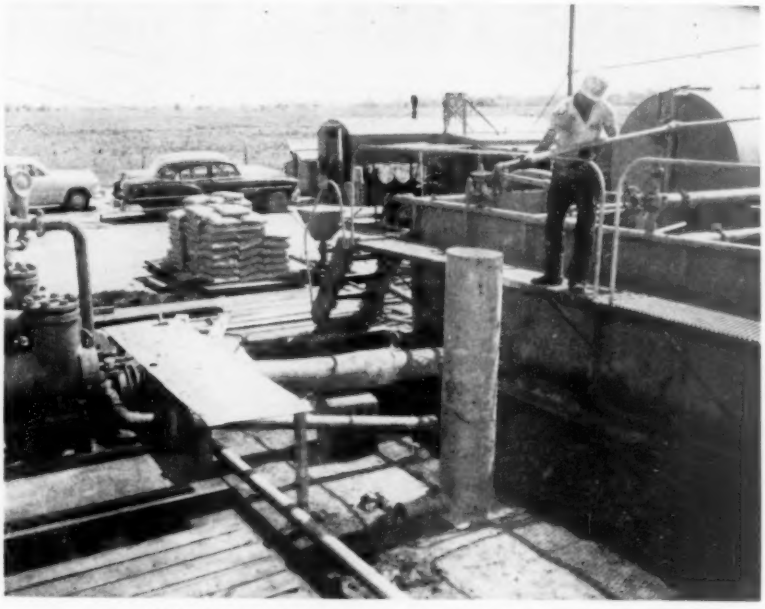
Where a means of finding f is provided, Equations 14 and 15 yield a solution for the pressure drop accompanying a given flow rate.

Calculation of pump horsepower . . . For this case, Equation 12 could be simplified to $V(P_2 - P_1) = -W$ because ΔX and the velocity term would be substantially zero. The friction drop is incorporated into an efficiency term E. If Q_L is expressed in g.p.m. the final equation may be expressed as:

$$W(\text{horsepower}) = \frac{Q_L(P_2 - P_1)}{(33{,}000)(7.48)(E)} \qquad (16)$$

The work is thermodynamically negative which makes the left side of the equation positive. This and all equations above have consistent units therefore care must be taken to assure that this condition is satisfied. In every case subscripts (1) and (2) refer to the initial and final conditions respectively in the direction of flow. **End.**

ON THE JOB . . . . . IN THE FIELDS



THIS 16-IN. PIPE is used to send dry mud to the drill pipe.

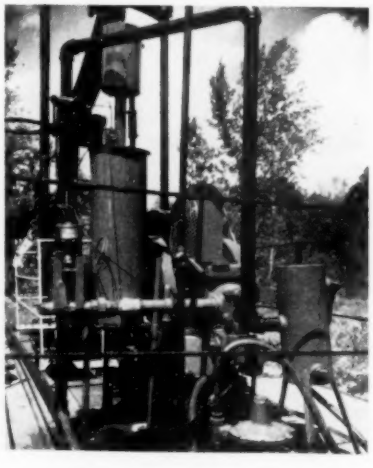
Barite dries drill pipe for round trip

ON one of Rowan Drilling Co.'s rigs, crews have rigged up a device to help them slug the pipe with heavy mud when they make trips. This keeps them from having to pull the pipe wet and getting splashed with mud and yet doesn't add a lot of weighting material to the mud system.

Usually only a couple of sacks of barite added by this device will lower effectively the mud level in the drill pipe in order that the pipe can be pulled dry.

The setup is simply a 16-in. pipe riser connected to the suction of the mud pump. Just before a trip is made, two or three sacks of barite are dropped into the riser and the jet from the pit is turned into it.

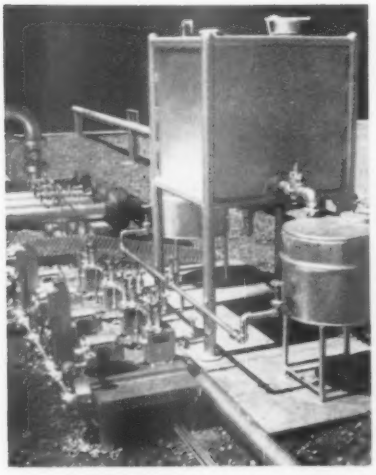
When the slug of heavy mud is mixed up the valve to the pump suction is opened and the pump sucks it into the mud stream. By the time the slug is all pumped the mud column in the pipe will be heavy enough to allow the pipe to be pulled dry.



Exhaust chamber strips gas from crude

IN Clay City field, Clay County, Illinois, Breuer-Robinson saves hauling butane for fuel by stripping gas from the crude. The gas manufacturer is an exhaust-heated chamber that removes gas from a small trickle of crude as it passes through.

A thermostat controls a bypass on the exhaust so that just enough heat is applied to furnish necessary gas for the engine. After being stripped, the crude then runs back into the casing head and down the well where it is pumped out with production.



RECTANGULAR TANK stores chemicals.

VALVES in suction lines make injection automatic.

Injection system regulates chemical flow

THIS compact, flexible chemical-injection system has been installed by Richfield Oil Corp. at one of the trap farms on Pier A property it operates for the city of Long Beach.

Chemicals are mixed and stored in the rectangular tank shown in rear of the battery of chemical-feed pumps. From the ½-bbl. measuring tanks the chemical feeds into the header from which the pumps take suction. A valve midway in the header, as well as provisions throughout the system, permit two chemicals to be handled if such is ever desired.

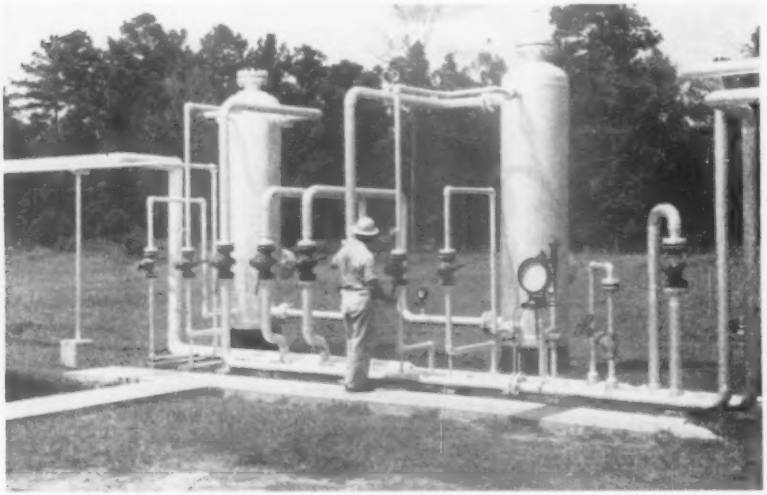
Feeders cut out . . . Valves in the individual suction lines permit feeders to be cut out or placed in operation as chemical requirements dictate. The pumps discharge into individual ½-in. lines which lead to the two manifolds serving the trap farm.

The chemical lines feed into a header at the trap farm. Valves in the header and in the stubs to the crude lines provide easy control of the volume of chemical injected into each flow line.

Jar holds run tickets

A SMALL jelly jar solves the problem of keeping run tickets dry until the pumper can pick them up. Because it seals water-tight, it is better than the usual tobacco can.

To fasten the jar, drill a hole in the rail of the tank stairway and a hole in the jar lid. Then bolt the lid to the rail, using washers to insure a water-tight seal. A twist of the wrist installs the jar. Since it is transparent, it shows whether a ticket has been left, even from the pumper or gager's car.



DEHYDRATION UNIT is designed for regeneration with high-pressure gas. Low-pressure gas can be used to advantage in regeneration when available. Sales gas and regeneration gas lines can be seen. Possible error, such as opening sales gas line to flare, is precluded.

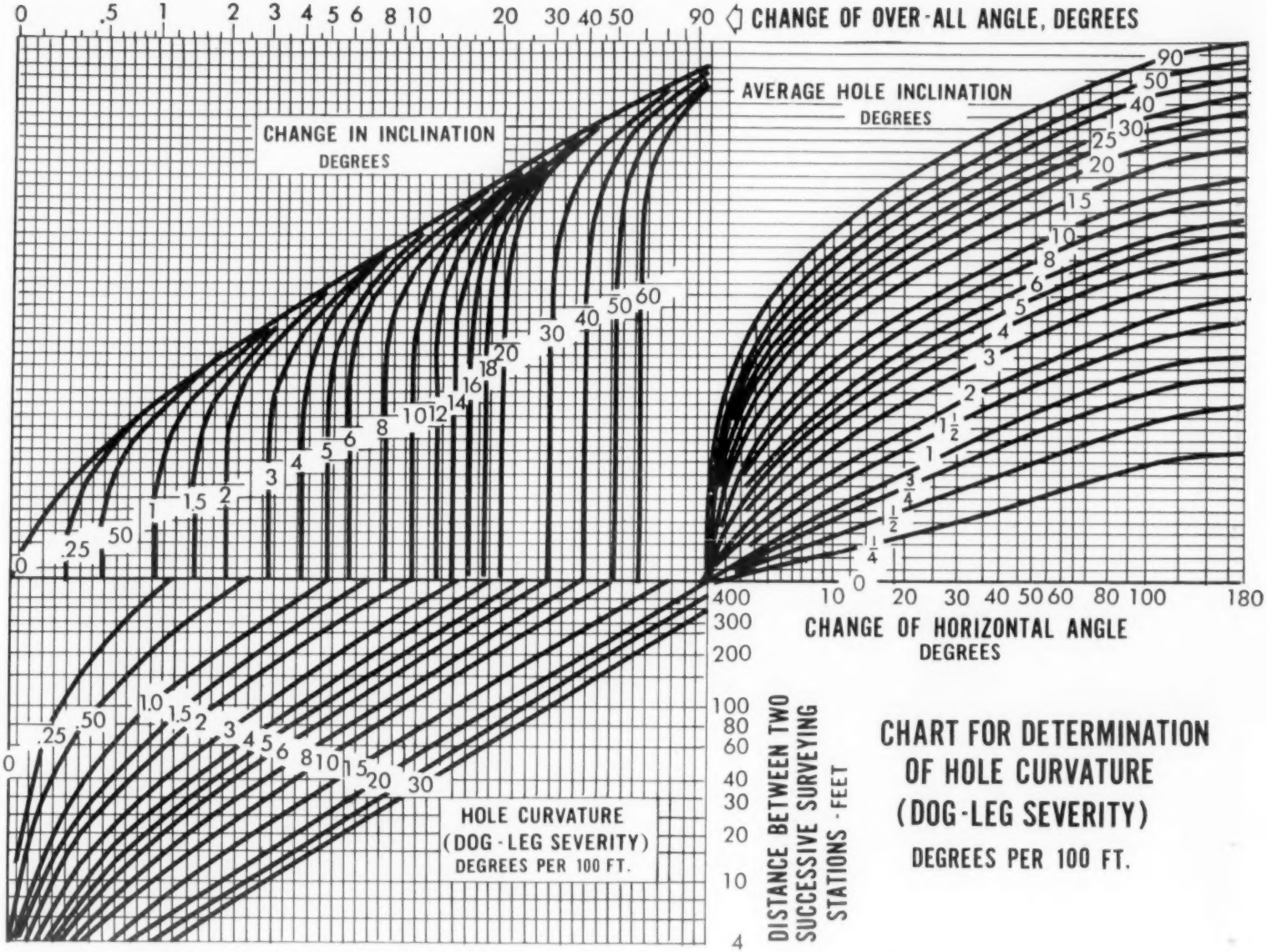
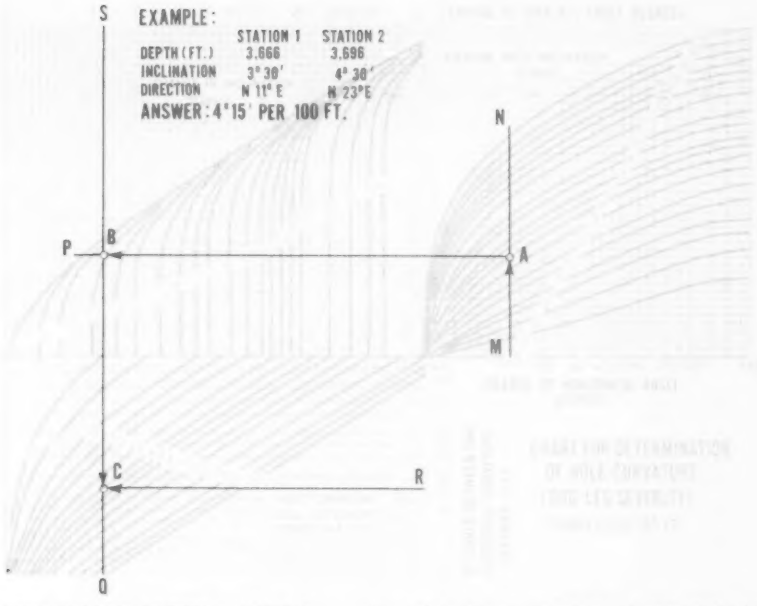

CHANGE OF OVER-ALL ANGLE, DEGREES
0 .5 1 2 3 4 5 6 8 10 20 30 40 50 90
CHANGE IN INCLINATION
DEGREES
0 .25 .50 1 1.5 2 3 4 5 6 8 10 12 14 16 18 20 30 40 50 60
AVERAGE HOLE INCLINATION
DEGREES
90 50 40 30 25 20 15 10 8 6 5 4 3 2 1½ 1 ¾ ½ ¼ 0
CHANGE OF HORIZONTAL ANGLE
DEGREES
10 20 30 40 50 60 80 100 180
HOLE CURVATURE
(DOG-LEG SEVERITY)
DEGREES PER 100 FT.
0 .25 .50 1.0 1.5 2 3 4 5 6 8 10 15 20 30
DISTANCE BETWEEN TWO SUCCESSIVE SURVEYING STATIONS - FEET
400 300 200 100 80 60 40 30 20 10 4

CHART FOR DETERMINATION OF HOLE CURVATURE (DOG-LEG SEVERITY)

DEGREES PER 100 FT.



TWO SURVEY POINTS provide hole curvature. Note change of direction is 12°. Point M. From M, go upward to average hole inclination (Point A), read across to change in inclination (Point B). Downward from B and across from R (distance between stations), read curvature at C. Fig. 1.

Hole curvature, if severe, can be costly.
Here are a chart and a procedure showing . . .

How to Spot Dog-Legs Easily

by Arthur Lubinski

IN recent years, large savings have been made in drilling "crooked" formations by not decreasing weight on bit and, whenever possible, permitting the deviation to build up to larger values than in the past. However, in presence of faults and/or unconformities, even if the deviation is permitted to build up, the weight is still frequently decreased because of a fear that the hole might drift in an undesirable direction or that a severe dog-leg might result.

If conventional inclinometer surveys were replaced by single-shot direction surveys, then these fears could be eliminated and more weight could be carried, thus obtaining additional savings. Such surveys would permit one to know, at any time, the direction of the drift, and to detect dog-legs.

Author is with the research department of Stanolind Oil & Gas Co., Tulsa. Article presented at a meeting of the A.P.I. Mid-Continent District Study Committee on Straight-Hole Drilling, October 31, 1956, Oklahoma City. Original title of the article was "Chart for Determination of Hole Curvature (Dog-Leg Severity)."

British-American runs such surveys in all its wells drilled in crooked-hole areas in Oklahoma. This company claims that the rental costs of a non-magnetic drill collar and a single-shot instrument, which are of the order of $30 per day, are largely offset by drilling savings.

Dog-legs cost . . . A dog-leg, even a severe one, does not cause immediate trouble, because the drill collars, being under compression, accommodate themselves easily to variations in the hole course. It is only much later that a dog-leg may become responsible for troubles and large losses of money. During drilling a few thousand feet below the dog-leg, the tool joints at the vicinity of the dog-leg press against the wall of the hole with a large force. The detrimental effects of this force are as follows:

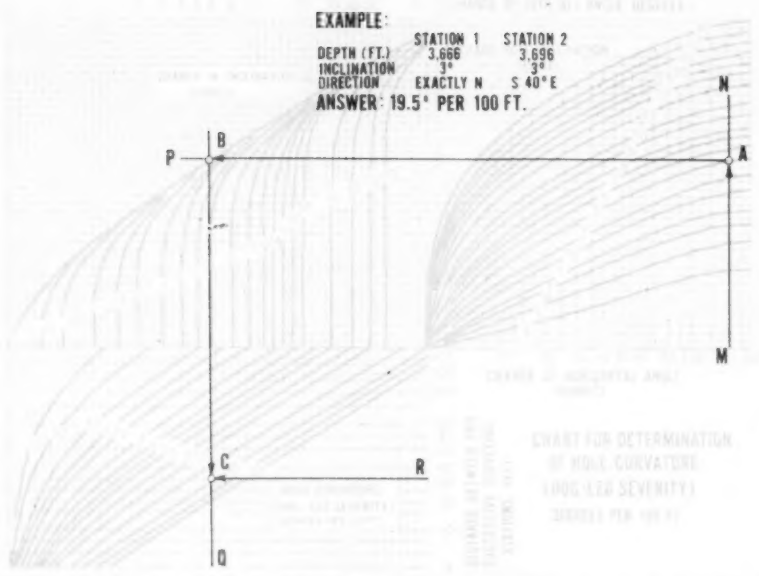
- Fast wear of tool joints.
- Key seats in the hole.
- Worn spots in the casing, which may result in its collapse early in the producing life of the well.

In addition, dog-legs may cause pumping difficulties.

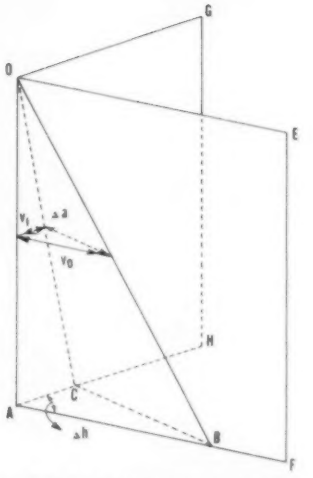
Therefore, early detection of dog-legs is desirable. In the event one appears in the hole far above the expected total depth, and if the dog-leg is very severe, then it should be reamed or the hole sidetracked. Fortunately, severe dog-legs, which generally occur in formation unconformities, are rare. Although it is not known from statistical data, it may be estimated that they occur once in 50 or 100 wells drilled in crooked formations.

Severity . . . A clause of maximum dog-leg severity is currently being written into British-American drilling contracts pertaining to wells in which the surface location is chosen by the contractor.[1,2] In these wells, advantage is taken of the natural drift of the hole instead of attempting to combat it.

The dog-leg severity is generally expressed in degrees per 100 ft. For explanatory purposes, consider a simple case in which the direction of the drift does not change and directional data



CHANGE IN DIRECTION in this case is 140°. Although inclination remained constant at 3°, hole curvature or dog-leg severity is 19.5° per 100 ft. Read from M to A to B to C. Fig. 2.



CALCULATIONS were made from this figure. OB and OC are hole directions at two different points. Fig. 3.

are not needed. Imagine two successive surveying stations 50 ft. apart. Assume that hole inclinations are 4° and 6° at the two stations. Then the average dog-leg severity between these stations is equal to:

$$(6^\circ - 4^\circ)/50 \text{ ft.} = 4^\circ/100 \text{ ft.}$$

In directional drilling, whipstocks are generally set in a way so as not to exceed a dog-leg severity of 5° per 100 ft., which does not result in any trouble. Therefore, such dog-legs can also be accepted in nondirectional drilling. How much more severe dog-legs could be tolerated depends upon the distance from the dog-leg to the total depth and size of hole, drill pipe, casing, tubing, sucker rods, etc. The effect of these variables on the maximum tolerable severity of dog-legs will be better known after more theoretical work is done and more field data are gathered.

Ways to measure . . . Several means are available for determining the average severity of a dog-leg in the general case when the dog-leg is due to a change in both the inclination and the direction. Eastman Oil Well Survey Co. uses a graphical method which requires use of either a protractor and a compass or an apparatus incorporating these two and called "ouija board."[3,4] Stanolind's research department developed means consisting of use of trigonometric formulas. British-American uses a method[5] in which the results are not given in degrees per 100 ft., as is normally the case.

The new chart presented in this paper permits one to read the dog-leg severity directly.

The problem of determining dog-leg severity was discussed on July 31, 1956, at a meeting of the Crooked Hole Subcommittee of the A.A.O.D.C. Rotary Drilling Committee, held in Midland, Tex. The desirability of standardizing the terminology was stressed. In the past, the dog-leg severity has also been designated as follows: rate of change of the over-all angle (Stanolind); horizontal departure (British-American); and hole curvature. The committee recommended the following designation: "Hole curvature (dog-leg severity)." This first expression is destined to be used in drilling contracts and the parenthetical expression is temporarily added to assure a fuller understanding of field personnel.

Use of the Chart

With the accompanying chart, the average value of hole curvature (dog-leg severity) between two successive directional survey stations may be directly obtained. The use of the chart will be explained with the following numerical example:

	Station 1	Station 2
Depth (ft.)	3,666	3,696
Inclination with respect to vertical	3° 30′	4° 30′
Direction of the inclination	N 11° E	N 23° E

The following calculations must first be made:

1. Change of horizontal angle:

$$23 - 11 = 12^\circ$$

2. Average hole inclination:*

$$(3\frac{1}{2}^\circ + 4\frac{1}{2}^\circ)/2 = 4^\circ$$

3. Change in inclination:

$$4\frac{1}{2}^\circ - 3\frac{1}{2}^\circ = 1^\circ$$

4. Distance between the two successive surveying stations:

$$3{,}696 \text{ ft.} - 3{,}666 \text{ ft.} = 30 \text{ ft.}$$

Fig. 1 shows how the hole curve (dog-leg severity) is determined with the chart.

Since the change of horizontal angle is 12°, construct the vertical line MN. Find its intersection with the 4° curve at A (4° is the average hole inclination). Proceed along the horizontal line AP until its intersection with the 1° curve at B (1° is the change in inclination). Construct the vertical line BQ. The horizontal line from R (30 ft. is the distance between stations) intersects BQ at C, which indicates the following answer:

Average hole curvature (dog-leg sever-

*For sake of simplicity the chart is based on an arithmetical-mean hole inclination. This results in values of hole curvature that are somewhat too large. The error is negligible if the ratio of hole inclination between two survey stations is no greater than two. If the ratio is greater than two, the error may be eliminated by use of the geometrical-mean hole inclination. Example:

Station 1 inclination: ½°.
Station 2 inclination: 4°.
Arithmetical mean: $(\frac{1}{2}^\circ + 4^\circ)/2 = 2.25^\circ$.
Geometrical mean: $(\frac{1}{2}^\circ \times 4^\circ)^{\frac{1}{2}} = 1.41^\circ$.

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See your Bucyrus-Erie distributor soon for the complete story on ½-yd. 15-B and ¾-yd. 22-B dragshovels . . . and give your crews the kind of equipment they need to keep pipe lines moving on schedule. 238E56

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ity) between the two surveying stations = 4° 15′ per 100 ft.

In the above case, the rate of change of the hole inclination is 1° per 30 ft., i.e., 3.3° per 100 ft. Therefore, the contribution of the change of the horizontal angle, although not negligible, is not predominant. The following example illustrates a situation in which the change of horizontal angle does predominate.

	Station 1	Station 2
Depth (ft.)	3,666	3,696
Inclination with respect to vertical	3°	3°
Direction of the inclination	Exactly N	S 40° E

Then:

1. Change of horizontal angle = 140°.
2. Average hole inclination = 3°.
3. Change in inclination = 0°.
4. Distance between the two successive surveying stations = 30 ft.

Fig. 2 shows in a similar manner as Fig. 1, the average hole curvature (dog-leg severity) between the two surveying stations to be 19.5° per 100 ft.

There is a scale on the chart which, being of less significance, has not been explained so far, namely, the scale of the change of over-all angle rather than hole curvature, which is the rate of change of this angle. In the case of Fig. 1, the change of over-all angle is read at S and is equal to 1.3°. This value may also be obtained from the previously determined value of hole curvature in the following way:

4.25° per 100 ft. is approximately equal to 1.3° per 30 ft.

References

1. Barrow, Claude, "Unique Contract Plays Part in Oklahoma's Deepest Well," Drilling, Mar. 1956.
2. Norris, Fred, "Two Contract Features That Promote More Economical Drilling," A.P.I. Division of Production meeting, Wichita, Kans., Apr. 1956, also The Oil and Gas Journal, June 4, 1955.
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APPENDIX

Derivation of formulas . . . Fig. 3 represents two vertical planes OAFE and OAHG intersecting along the vertical line OA. Consider that at a certain depth the tangent to the axis of the hole is parallel to the plane OAFE and that the angle AOB, designated as v_0, is equal to the inclination of the hole. Consider that somewhat deeper in the hole the axis of the hole became parallel to the plane OAHG and that the angle AOC, designated as v_1, is equal to the new inclination of the hole. The change of horizontal angle is represented by the angle FAH, designated as Δh. The over-all change of angle is, of course, equal to the angle BOC and is designated as Δa.

The following relationships are obvious when considering the right triangles OAB and OAC respectively.

$$AB = OA \tan v_0 \quad (1)$$

$$AC = OA \tan v_1 \quad (2)$$

In the triangle ABC we have:

$$(BC)^2 = (AB)^2 + (AC)^2 - 2\,(AB)\,(AC)\cos(\Delta h) \quad (3)$$

Substituting (1) and (2) into (3), we obtain:

$$(BC)^2 = (OA)^2 [\tan^2 v_0 + \tan^2 v_1 - 2 \tan v_0 \tan v_1 \cos(\Delta h)] \quad (4)$$

In the right triangles OAB and OAC we have, respectively:

$$OB = \frac{OA}{\cos v_0} \quad (5)$$

$$OC = \frac{OA}{\cos v_1} \quad (6)$$

In the triangle OBC we have:

$$(BC)^2 = (OB)^2 + (OC)^2 - 2\,(OB)\,(OC)\cos(\Delta a) \quad (7)$$

Substituting (4), (5), and (6) into (7) and solving for cos (Δa), we obtain:

$$\cos(\Delta a) = \frac{(1/\cos^2 v_0) + (1/\cos^2 v_1) - \tan^2 v_0 - \tan^2 v_1 + 2 \tan v_0 \tan v_1 \cos(\Delta h)}{2/(\cos v_0 \cos v_1)}$$

which may be transformed as follows:

$$\cos(\Delta a) = \cos v_0 \cos v_1 + \sin v_0 \sin v_1 \cos(\Delta h) \quad (8)$$

Formula 8 would be convenient only if Δa were large. For relatively small value of Δa, cos Δa is almost equal to unity and Δa cannot be calculated with tables. For this reason, Formula 8 has been transformed as follows:

$$\cos(\Delta a) = \cos(v_1 - v_0) - \sin v_0 \sin v_1 [1 - \cos(\Delta h)] \quad (9)$$

$v_1 - v_0$ is the increase of inclination and will be designated as Δv:

$$v_1 - v_0 = \Delta v \quad (10)$$

The following relationships are well known:

$$\cos(\Delta a) = 1 - 2 \sin^2(\Delta a/2) \quad (11)$$

$$\cos(\Delta v) = 1 - 2 \sin^2(\Delta v/2) \quad (12)$$

$$1 - \cos(\Delta h) = 2 \sin^2(\Delta h/2) \quad (13)$$

Substituting (10), (11), (12), and (13) into (9) and solving for $\sin^2(\Delta a/2)$, we obtain:

$$\sin^2(\Delta a/2) = \sin^2(\Delta v/2) + \sin^2(\Delta h/2) \sin v_0 \sin v_1 \quad (14)$$

from which:

$$\Delta a = 2 \arcsin [\sin^2(\Delta v/2) + \sin^2(\Delta h/2) \sin v_0 \sin v_1]^{1/2} \quad (15)$$

Generally, the hole inclinations v_0 and v_1 at two successive surveying stations are close to each other. Therefore, these inclinations may each be replaced by the average value v; thus, Equation 15 becomes:

$$\Delta a = 2 \arcsin [\sin^2(\Delta v/2) + \sin^2(\Delta h/2) \sin^2 v]^{1/2} \quad (16)$$

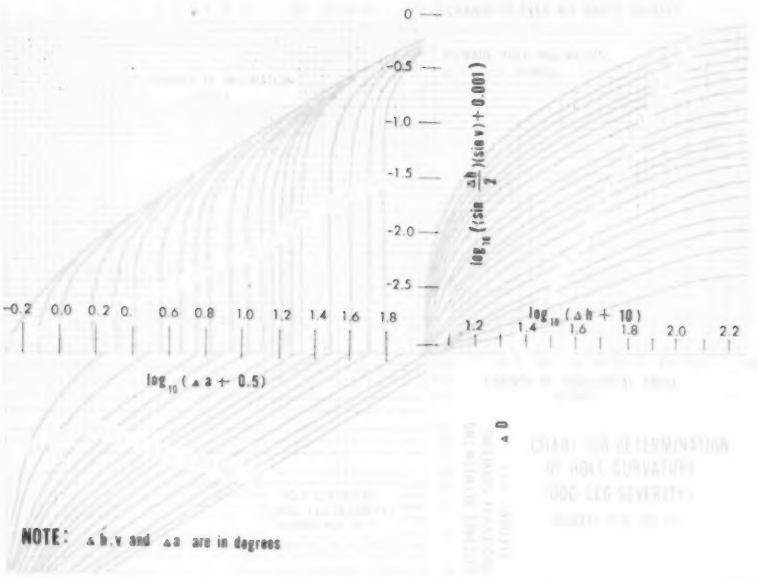
Construction of the chart . . . The previously explained chart is a graphical representation of Equation 16. Construction is shown in Fig. 4.

The abscissa and the ordinate of the upper right section are essentially Δh and sin ($\Delta h/2$) (sin v) respectively. Several curves, each for a constant value of v, have been computed and plotted.

Also, the abscissa and the ordinate of the upper left section are essentially Δa and sin ($\Delta h/2$) (sin v). Curves for constant values of Δv have been computed and plotted.

The abscissa and ordinate of the lower left section are essentially Δa and ΔD (distance between two successive surveying stations). Curves for constant values of $\Delta a/\Delta D$ have been computed and plotted.

Coordinates have been distorted as indicated in Fig. 4 to get a more suitable distribution of curves.



CONSTRUCTION of chart for hole-curvature determination. Note that a constant is added to the variables and the logs of the functions are plotted as coordinates. This provides better distribution of the curves. Fig. 4.

Discussion . . .

by Bob True

Big Chief Drilling Co.

First, I would like to compliment Arthur on his latest venture into "crooked hole" territory. It seems that Arthur's greatest desire is to make it easier for us rock-bit hands to define our problems more thoroughly whereby we can come closer to gaining a solution, especially in crooked-hole or straight-hole drilling problems.

The greatest push received by the operators and contractors alike in drilling holes in areas of steeply deviating beds is the company's relaxation of previously minimum deviation limits. Including in drilling contracts this acceptance of the slant-hole type of drilling has definitely reduced the cost of drilling these holes and in our opinion has greatly reduced the risk involved in minimum deviation control, which prevailed previously. While some of us have made attempts to determine dog-leg severity through calculations, we feel these charts will greatly simplify the problem and reduce the time required when determining our particular dog-leg severity angles.

Our records reveal that in the case of wells drilled in Garvin County and particularly in the Eola field area, where crooked-hole problems can be severe, these holes change direction as well as angle in relative short intervals.

One particular example I recall, the deviation increased from 6° north, 40° west to 7° north, 50° east in 60 ft. Analyzing this in Arthur's charts you come up with a dog-leg severity of approximately 15°. Surprisingly enough this angle occurred at around 6,500 ft. The well was drilled ahead to approximately 11,500 ft. Sixty to seventy days were required to go from 6,500 to 11,500 ft. During this time there was no indication of key-seat or dog-leg trouble. The well was then completed without incident.

To site an example of holes where minimum deviation was allowed at 3° to a total depth of 8,500 ft., we have experienced key seats sufficient to give us trouble where the maximum deviation at the point of the key seat was not over ¾°. Examining this particular example in Arthur's charts we find the dog-leg severity nil. The depth in which the key-seat occurred was approximately 2,300 ft., but the time in the hole below this depth was only 15 days.

While it could be assumed possibly that this key seat was due to a lime edge, washout, etc., allowing the key seat to form rapidly, this example is given just to illustrate the point that key seats are entirely possible under minimum deviation control, especially when the hole is allowed to wander back and forth within the specified deviation limits. We feel that once a hole has started deviating care should be taken to prevent the hole from straightening up too rapidly regardless of the total angle involved.

These examples are given just to illustrate what is possible with slant-hole drilling and also to explain how minimum deviation control can cause hazards which many times are probably overlooked—for the moment anyhow.

Therefore, in our case and I am sure in the case of most contractors and operators, we feel that whenever possible, the deviation limits should be relaxed to the greatest extent, thereby increasing the efficiency of the operation as well as reducing the over-all hazard of drilling the well.

and by R. B. McCloy

Big X Drilling Co.

The chart for determination of hole curvature by Mr. Lubinski presents a simple method of placing a numerical value on hole curvative, so that for a given area with some experience it should be possible to eliminate ordinary drift readings and utilize curvature measurements. A comparison of Examples 1 and 3 in the paper indicates the fallacies of drift readings on which a large part of the industry now depends. Example 1 would be considered by many to be a hazardous situation since the drift increases from 4° to 6° in 50 ft. of hole. Since the direction did not change, the curvature is 4° per 100 ft. In contrast with Example 3 the drift did not change, which would be considered by many to be a good hole.

By using the chart, it is noted that the curvature for Example 3 is 19.5° per 100 ft., which compares with 4° per 100 ft. in Example 1. This is not surprising to those who have studied the problem closely, but utilization of the chart makes it very simple to determine curvature and by comparison with drift, the chart should be helpful in amplifying the difficulty of using a drift reading alone.

This committee (Straight-Hole Drilling), 4 years ago pointed out the "Need for Definition of a Crooked Hole." That paper was prepared to provoke thinking while the complete problem was studied. With the chart and some experience, a crooked hole may soon be defined. To make this definition a reality, this committee should review directional surveys, determine the curvature from Lubinski's charts, correlate with drilling or producing problems, and for certain areas determine the maximum values that can be tolerated without difficulty.

I would like to add to the three difficulties presented—tool-joint wear, key seats, and worn spots in the casing—a fourth difficulty which is attracting current attention, that being, wall hanging of the drill pipe or drill collars due to the differential pressure between the hydrostatic head of the mud and the formation pressure.

Using Electronic Computers in the Oil Industry

Computers Introduce Unique Language

by Jon Vinson
The Datics Corp.

THE young man had just been promoted to an executive position and it was now his responsibility to be in direct liaison with the other departments. One of these departments was the firm's computing installation. He would now have to understand his problem in relation to the machines. He would have to understand computer planning and he must be able to differentiate between practical and impractical applications.

On a tour of the computing installation, he asked the status of the problem currently on the computer. The operator replied, "The problem is now in the third pass and if it does not converge on this iteration, a branching command will tell it to tab out in floating point and then loop back using a second guess derived from a variation of Newton's method." The young executive managed to stammer something to the effect that he would have to return to college for 4 more years.

Extra study . . . However, a speaking knowledge of computers can be obtained in 3 or 4 weeks of extra study. The important point is that our young executive had been placed abruptly into contact with a new world; a world that business and industrial leaders are fast realizing they must recognize: the world of computer languages.

In this new world, the central figure is the digital computer. A digital computer is a mechanical and/or electronic device that uses an ordered set of instructions to operate on an intelligible group of data to produce answers of significance. Thus, a small desk calculator would be included in this category.

Digital computer . . . To understand the basic philosophy of the modern-day digital computer one must first become familiar with programing. A program is the above-mentioned ordered set of instructions. These instructions are of three basic types: arithmetic, logical, and input-output commands.

Arithmetic orders are the basic operations such as addition, subtraction, multiplication, and division. Logical commands enable the computer to make a decision based on calculated results and to change to another phase of the program. The input-output commands instruct the machine to read and write.

The computer memory is that segment which has the ability to store numbers. In the system we will consider throughout this discussion, each memory cell can contain a 10-digit number plus its sign. Computers have memory capacities ranging from 1 to 1,000,000 such numbers.

Machines designed with increased memory capacities usually are designed as stored-program computers. That is, the entire program is entered into the computer and stored in the same memory device with the data and the intermediate results.

Cell memory . . . We shall now consider how the computer knows which order to execute and when. Each of the 10-digit numbers is defined as a computer word. This word might be an instruction or an item of data. Also, each cell is designated with an address. For example, if our computer has a 4,000-cell memory, these cells would be numbered from 0000 to 3999.

The program is loaded into the computer in any consecutive set of locations. Then the computer is told where to find its first instruction. From here it will always go to the next consecutive cell for its next instruction. This type of operation is known as a single or sequential address system. The word structure for this system is as follows:

$$\pm AAAABBCCCC$$

The sign position and A positions are for special controls.

The B positions are for a two-digit instruction code.

The C positions are for the four-digit address of the operand.

As an example, let us evaluate the equation,

$$\frac{AX^2+BX-C}{D}$$

We will first assume our data are loaded in the computer as follows:

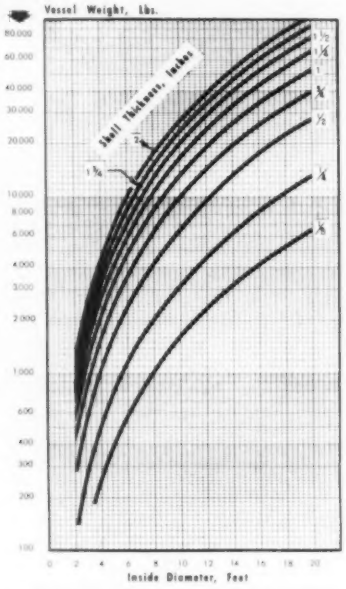
Cell 2000 = X
Cell 2001 = A
Cell 2002 = B
Cell 2003 = C
Cell 2004 = D

Also we will assume our program is to be loaded starting in cell 1000. Given the definition of the various numerical codes, the final program is given in the table insert.

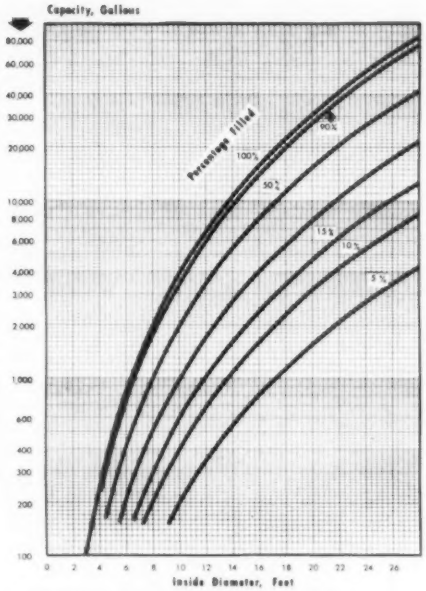
TABLE 1—FINAL PROGRAM

Instruction location	Actual instruction: Extras	Order	Address of operand	Definition of order	Effect on computation
1000	+0000	10	2000	Clear accumulator and add the contents of cell 2000	X in accumulator
1001	+0000	24	2000	Multiply accumulator by contents of cell 2000	X^2 in accumulator
1002	+0000	24	2001	Multiply accumulator by contents of cell 2001	AX^2 in accumulator
1003	+0000	13	2001	Store contents of accumulator in cell 2001	AX^2 now in 2001
1004	+0000	10	2000	Same as item one.	X in accumulator
1005	+0000	24	2002	Multiply by cell 2002	BX in accumulator
1006	+0000	71	2003	Subtract from accumulator the contents of 2003	(BX−C) in accumulator
1007	+0000	35	2001	Add to the accumulator the contents of cell 2001	(AX^2+BX-C) in accumulator
1008	+0000	42	2004	Divide accumulator by contents of cell 2004	$(AX^2+BX-C)/D$ in accumulator
1009	+0000	27	0000	Stop the computer. Answers will appear in accumulator	

SPHERICAL PROCESS VESSELS—5



SPHERICAL-VESSEL WEIGHT (theoretical) for the usual shell thicknesses. Fig. 1.



SPHERICAL-TANK CAPACITY is plotted with capacity at various percentages shown. Fig. 2.

Charts for the Spherical-Vessel Designer

by Dave Vondy
Constructive Engineering Co.

IN anticipation of future wide application of spherical vessels, various charts will be presented in this part to aid the designer. Material has been chosen which will be of most benefit in design, selection, and economic analysis.

Shell thickness . . . The wide variety of vessel sizes, pressures and allowable stresses makes thickness calculations a voluminous task. In general, it can be said that for very thin-wall vessels, low tensile strength steel is most economical. Those vessels with an appreciable shell thickness can most economically be made of high-tensile-strength steel such as A-212.

The new T-1 steel which has an extremely high tensile strength can often be used to advantage.

The following equations are those usually used:

For thin-wall vessels or quick estimates,

$$t = \frac{PR}{2S}; \quad P = \frac{2St}{R}$$

For code construction,

$$t = \frac{PR}{2SE - 0.2P} + c;$$

$$P = \frac{2SE\,(t-c)}{R + 0.2\,(t-c)}$$

Definition of Symbols

- t = required thickness, in.
- S = maximum allowable stress, psi.
- P = design pressure, psi.
- R = inside radius, in.
- c = corrosion allowance, in.
- E = efficiency of least strong joint, decimal

It would be wise for manufacturers to agree on a standard set of sizes before wide variation results. It is impractical to manufacture heads having both nominal inside and outside dimensions. It appears feasible to standardize on nominal inside diameters in even dimensions in feet except that probably small sizes should also be made available in increments of 6 in.

The theoretical weight of spherical vessels is plotted, Fig. 1, for the usual shell thicknesses. It should be kept in mind that often actual shell thickness will usually run over theoretical (by as much as ¼ or ⅜ in. in small vessels) and the mean thickness should be used for determining vessel weight.

If a tank should be required to have a capacity of 10,000 gal. plus 5 per cent gas outage and 5 per cent sump space, the 10 per cent capacity would be calculated as being:

$$10{,}000\,\frac{10}{90} = 1{,}110 \text{ gal.}$$

The vessel diameter would be selected at 14.1 ft. See Fig. 2.

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ROCK-BIT DESIGN, SELECTION, AND EVALUATION

Part 15

Proper Bit Selection Gives Top Performance

OF prime importance in getting top bit performance and subsequent reduction in drilling costs is the problem of proper bit selection.

How bit selection and performance are influenced by bit size, bit weight, rotary speed, drilling fluids, and hydraulics already has been developed in various articles.[1] Detailed information on rock-bit design that will result in a clearer understanding of the problems involved is given here.

Without a complete knowledge of all factors, the proper type of bit cannot be designated for a given formation. For example, weight limitations alone may dictate the use of a variety of bits within one formation category. As stated previously, the necessity of using lighter bit weights quite frequently dictates the use of a different type of bit than that which would be used under heavier weights.

Drilling tests . . . To show the variations in drilling characteristics of several bit types, a series of laboratory drilling tests were made. In these tests each type of bit was used to drill an equal distance in a uniform material under constant conditions of rotary speed and bit weight.

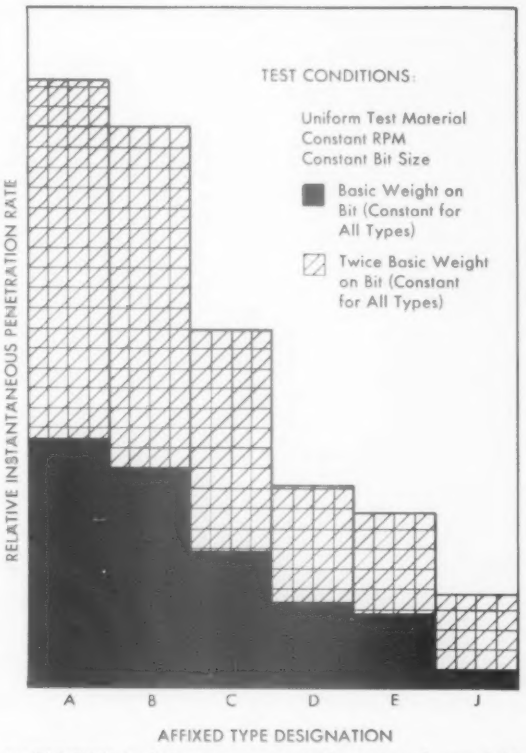
The time required to drill the specific distance provided the data from which the instantaneous penetration rate of each was determined. Additional values were obtained by rerunning each of the bits under identical conditions, with the exception of bit weight. For these values, twice the basic weight of the first test was used. The relative variations in penetration rates are shown in Fig. 30.

An analysis of the chart, however, provides several interesting observations. For example:

1. The variations that exist in the drilling characteristics of different bit types are quite apparent.

2. The relatively small difference in instantaneous penetration rates among some of the types indicates the possibility of similar differences among certain bits run in the field. It is conceivable that more teeth, larger bearings, etc., in the harder formation type will result in an increase in overall performance which will more than offset the lower penetration rate.

3. In certain formations the penetration rates of some types under lighter weights may be comparable to those of other types under heavier weights. Providing the difference in bit design is favorable, this suggests that it may be advantageous in some formations to change to a softer formation bit type where lighter-than-normal bit weights are required.



VARIATION in instantaneous penetration rates of several bit types under a given set of conditions and effect on instantaneous penetration rate with increased weight. Fig. 30.

Undeveloped area . . . Selection in an undeveloped area is of necessity based first upon certain probable factors. Since geological data may be limited, the drilling characteristics of the formation must be estimated and selection made on the basis of formations anticipated. Down-hole conditions present another question mark in an undeveloped area. At the beginning of an operation in such an area, the possibility of crooked-hole problems must be considered.

Variations in the drilling fluid due to lost circulation and formation characteristics may also develop. As a result, the effect on bit weight and rotary speed may require the use of a larger number of bit types.

During drilling operations in an undeveloped area, selection is based upon additional factors. Performance and the condition of the dull bits should be evaluated to determine whether or not proper selection has been accomplished previously. Actual bit weight and rotary-speed limitations must be applied and the formation encountered analyzed to determine if its drillability is compatible with the drilling characteristics of the bits selected.

A knowledge of bit design and the relationship of this design to the formation characteristics is important to obtain maximum bit value.

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Part 2

REFINER'S NOTEBOOK

Corrosion of Ferrous-Metal Tubing

On-the-Site Conditions Affect Corrosion

by Thomas M. Krebs

THE general deterioration of a carbon-steel tube used for reducing the temperature of Platformer effluent is shown in Fig. 1. In this case a sulfurous flare in the vicinity of the water-cooling tower contaminates the water so that severe corrosion of the exchanger tube occurs. This case also serves to point up the importance of on-the-site environmental situations which may seriously influence corrosion attack and which cannot be readily anticipated by the designer.

Many corrosion problems involving general chemical attack of carbon or alloy steel at low temperature may be solved by the use of stainless steels. The austenitic chromium-nickel stainless types of steel are most frequently used because of their excellent and versatile corrosion-resisting properties and their amenability to fabrication.

Stainless alloys . . . The ferritic stainless steels or so-called straight chromium grades also offer advantages in many corrosion requirements. All of the stainless alloys depend for their corrosion resistance on a surface film of chromium compounds whose formation requires minimum chromium content of about 10½ per cent in solution in the metal.

This film is passive and confers resistance to chemical action as long as it remains intact. General corrosion of properly treated chromium-nickel stainless can be traced frequently to misapplication of the alloy in reducing media such as hydrochloric acid, hydrofluoric acid, and intermediate concentrations of hot sulfuric acid in which the corrosion-resisting film is destroyed and the unprotected metal dissolves. The stainless steels perform best in oxidizing environments such as air or nitric acid in which the film is sustained or is healed when broken.

Intergranular corrosion of austenitic stainless steels is characterized by a powdering or dusting of the metal. The attack while occurring locally at grain boundaries may result in general deterioration of the affected metal. Figs. 2 and 3 show the severe granulation and wastage occurring in a Type 317 chromium-nickel-molybdenum stainless heat-exchanger tube which failed in 2 weeks in a sulfur dioxide water separator in a gasoline-treating plant.

The author is metallurgist, Tubular Products Division, Babcock & Wilcox Co. Article presented at Western Petroleum Refiner's Association meeting, Wichita.

Fig. 1.

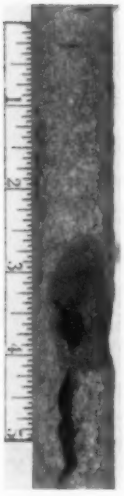
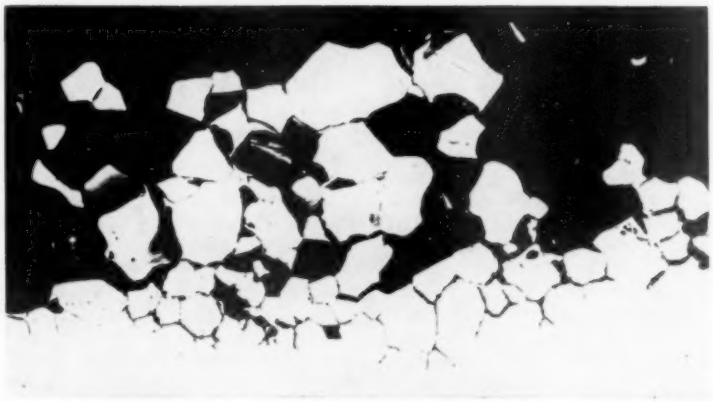
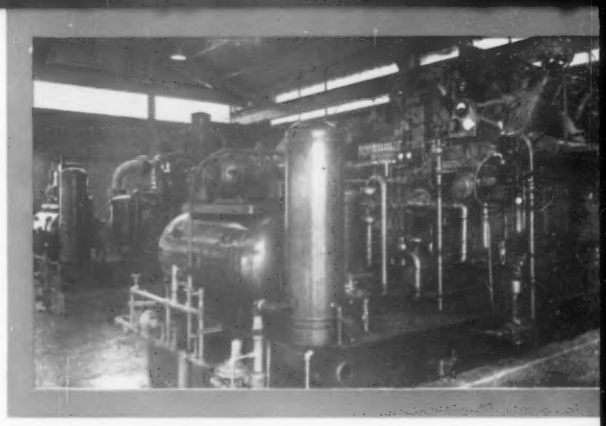


Fig. 2.



SEVERE INTERGRANULAR attack at outside surface of Type 317 tube shown in Fig. 2. Fig. 3.



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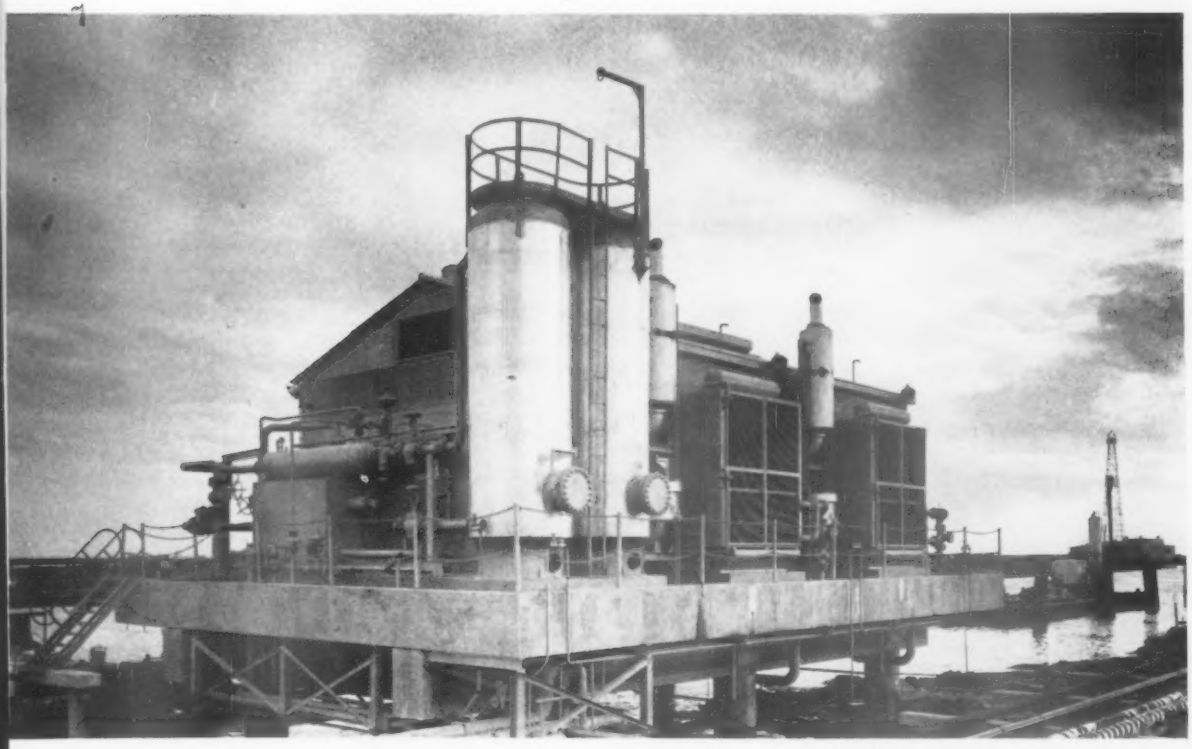

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Drilling Contractors

Texon Drilling Co. is near contracted depth on the wildcat test it has been drilling for F. B. Cochran, Jr., and James C. Freeman, 8 miles northeast of Placedo, in Victoria County, South Texas. The well, 2 Keeran, in the Martin de Leon Survey, was set up to go to 5,350 ft.

K. L. Kellogg & Sons, Compton, Calif., are drilling on a new 8,000-ft. contract operation in the Fellows area, in southwestern Kern County, California. It is the first of two exploratory wells The Texas Co. has proposed to put down off the west side of production. Designation is 1 CWOD B (NCT-1). Spot is in 25-31-22. The Republic zone is the objective.

Glasscock-Wilson, Inc., Shreveport, has a new 9,500-ft. operation 2 miles west of Bayou Mallet field, in northern Acadia Parish, southern Louisiana. It is a contract job for Argo Oil Corp., A. C. Duerr, and R. N. Hart, of Tulsa. Location is on their Darville Bazine lease, in 43-7s-1e.

H. F. Hatcher & Son, Smackover, Ark., is under contract for a 4,500-ft. Cotton Valley test to be drilled north of the old shallow producing area at Smackover, in southern Ouachita County, southern Arkansas. The test is for Dr. John L. Hall, of Magnolia, Ark., at 1 Corley, in 22-15s-16w.

South States Drilling Co. has two new contract operations in East Texas. One is a 6,200-ft. Rodessa well for S. H. Killingsworth in Kildare field, 4 miles south of Kildare, in Cass County. The other is a 7,500-ft. well for Robert Cargill in Tatum field, 2½ miles west of Tatum, in Rusk County. The Kildare job is at 1 Young, in the G. Gerdes Survey. The other is at 1 Beckham, in the Thomas O'Bar Survey.

United Drilling Co. is contractor on a wildcat test Atlantic Refining Co. is starting 2½ miles east of Grigsby, in southwestern Shelby County, eastern Texas. Location is at 1 Olin Oil & Gas Corp., in the J. H. Garner Survey.

Leatherwood Drilling Co. is drilling for McAlester Fuel Co. at a wildcat location 6 miles northeast of Hobbs, in eastern Lea County, southeastern New Mexico. Location, at 1-A Hallmark, in 18-18-39, is between East Hobbs field, on the south, and South Carter, on the north.

Jett Drilling Co., Shreveport, is on a new job a mile east of Church Point field, in southern Jefferson County, Mississippi. It is drilling for Robert Oil Co., of New Orleans. Location is a wildcat at 1 Drake, in 11-8n-1w. Contract is for 6,000 ft., a Wilcox test.

Vasser & Brown, Inc., Natchez, Miss., has another operation under way in southern Jefferson County, Mississippi. It is a 6,000-ft. Wilcox test for Fred E. Simmons, Jr., of New Orleans, at a wildcat location, 1 Simon-Geoghegan, in 28-8n-1e. Location is 2 miles northeast of Sunnyside field.

Casey & Montgomery, Bakersfield, Calif., are drilling on a wildcat location in the Reef Ridge area, 5 miles southwest of Avenal, in Kings County, Central California. It is a 7,000-ft. test, 31X-16 Mouren, for Golden Bear Oil Co. and John Manley III. Location is in 16-23-17.

Noble Drilling Co., of Tulsa, is drilling on another deep test Samedan Oil Corp., of Ardmore, Okla., is putting down in the Bayou Choupique area, Calcasieu Parish, southwestern Louisiana. It is the operator's third test. Location, at 1 Brannon, in 17-11s-10w, is on the south side of the old field.

Turnbull & Zoch Drilling Co. has a rig under contract to Republic Gas Co. for an 11,500-ft. test a mile northwest of Portland, on the north shore of Corpus Christi Bay, San Patricio County, Texas. It is Republic's 2 Garrett, in the Miguel Arciniego Survey.

Kirkpatrick Drilling Co., Corpus Christi, is getting under way on a 6,500-ft. contract job 5½ miles east of Delmita, Starr County, in Texas' Rio Grande Valley. Location is at 1 Echols and others, in Section 15, El Benadito Grant.

Gustavson Drilling Co., Ltd., Calgary, Alta., is getting started on a remote wildcat location in the far-northern sector of Alberta Province, Canada. It will be "basement" test (about 5,500-ft.) for Union Oil Co. of California, Ltd. Location is in the Grant Lake area, 45 miles northwest of Union's Red Earth Creek discovery,

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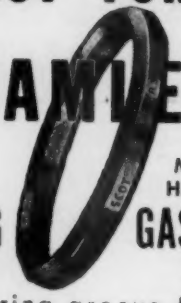

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and about 70 miles northeast of Peace River. Union lists the test as Grant Lake No. 11-31 with location in LSD 11, 31-93-15w5.

Wagner & Wynant Drilling Co., Amarillo, Tex., is drilling on another test for D. D. Harrington in the Southwest Eads area, southern Kiowa County, southeastern Colorado. The operation, 1-A Morse, in 28-20s-48w, is set up as a Morrow test with objective about 4,800 ft.

South States Drilling Co. is keeping a rig running for Robert Cargill, of Longview, Tex., in the Tatum area, Rusk County, East Texas. Present job is at 1 Beckham, in the Thomas O'Bar Survey. It is 2½ miles west of town.

H. L. Edwards Drilling Co., Houston, has contracted with Continental Oil Co. for a 12,900-ft. test on the northeast flank of Bayou Long field, in Iberia Parish, Coastal Louisiana. It will be drilled as 4-A Williams, Inc. Spot location is in 4-13s-11e.

Sutton Drilling Co., San Antonio, has a rig running on a wildcat location 11 miles northeast of Smiley, in Gonzales County, Southwest Texas. It is a 4,000-ft. contract job for George Coates. Location is on the operator's Tenberg lease, in the William Newman Survey.

Frio Drilling Co., San Antonio, has a new wildcat operation in Victoria County, South Texas. It is a 4,500-ft. test for the contractor's own account. Location is for 1 Sens, in the C. de la Garza Survey.

Southland Drilling Co. is scheduled for a 6,00-ft. test to be drilled for Skinner Corp. at 1 Cartwright, in the H&GN Survey 226, 11 miles south of Los Angeles, in Central LaSalle County, Southwest Texas.

Harkins & Co. is contractor on a 9,000-ft. test Colorado Oil & Gas Corp. and Commonwealth Oil Co., of Houston, are putting down about a half mile east of La Ward, in southeastern Jackson County, Texas Gulf Coast. The operation, a wildcat, is listed as 1 Bolling, with spot location in the Peter Aldrich Survey.

Owen Drilling Co., Lafayette, La., is on a 11,500-ft. extension test in the East Bell City area, eastern Calcasieu Parish, southwestern Louisiana. It is a contract job for a group, including Lyons & Logan, W. W. F. Oil Corp., and Trice Production Co. Location is at 1 Sweet Lake Land & Oil Co., in 35-10s-6w. Contract is for 11,500 ft.

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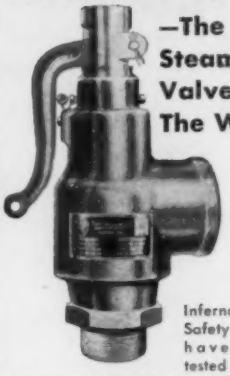

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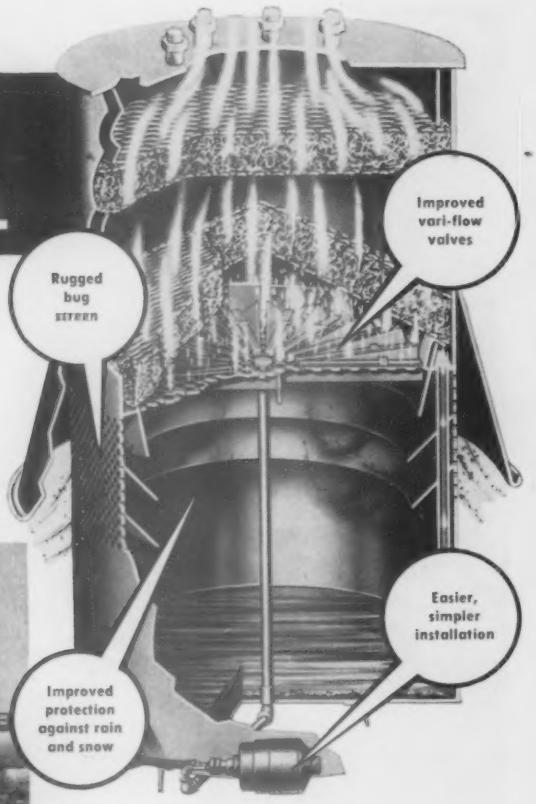

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Pipeline Patrol

. . . Report on Construction

Under Way, Contracted, and Planned

PIPELINE activity reported here is compiled from surveys conducted by The Oil and Gas Journal among pipeline companies and contracting firms. Projects listed include those proposed, contracted, and under way. Uncontracted projects are indicated by • preceding the project.

Crude-Oil Pipelines

• **Cape Pipe Line Co.** (organized by Sun Oil Co., Cities Service Co., Atlantic Refining Co.)

Project: Long range plans for line on the lower Delaware Bay to the Philadelphia refining area.

Completion: 1960.

Fulton, R. H. & Co., Lubbock, Tex.

Project: 39 miles of 6-in. from Donkey Creek field in northeastern Wyoming, southeast to the Osage pump station in Weston County.

Status: Fulton, a contractor has applied to Wyoming Public Service Commission.

Humble Pipe Line Co.

Project: 94 miles of 18-in. from its Ector Station near Odessa to its Kemper Station near Big Lake, Tex.

Status: Under way.

Contractor: **Lone Star Constructors,** H. A. (Red) Wylie, superintendent, office at Big Lake.

Completion: Mid-February 1957.

• **Interstate Oil Pipe Line Co.**

Project: 5 miles of 4-in. from South Bosco field, Louisiana, to present main line, and 5 miles of various size from Church Point field, Louisiana, to present main line.

Status: Proposed.

• **Northwest Pipeline Corp.** (an affiliate of Pacific Northwest)

Project 80 miles of 8-in. and 300 miles of 10-in. crude and products line from Four Corners area to Salt Lake City.

Status: To start May 1957.

Completion: August 1957.

• **Offshore Gathering Corp.,** Houston.

Project: 364 miles of mostly 20-in. in Gulf of Mexico off Louisiana. (Dual line.)

Status: Proposed.

• **Pasotex Pipe Line Co.**

Project: 127 miles of 20-in. along its route from Wink to El Paso, retiring another dual 8-in. section.

Status: Under way.

Completion: July 1, 1957.

• **Sinclair Pipeline Co.**

Project: 150 miles of 20-in. from Teague, Tex., to Houston.

Status: Planned for 1958.

Completion: 1958.

• **Tecumseh Pipe Line System** (Joint venture of Sinclair Pipe Line, Ashland Oil & Refining, and Pure Oil Co.)

Project: 190 miles of 20-in. between Griffith, Ind., and Cygnet, Ohio.

Status: Under way.

Completion: September 1957.

• **Texas-New Mexico Pipe Line Co.** (owned by The Texas Co., Sinclair Pipe Line Co., Tidewater Oil Co., and Empire Gas & Fuel Co.)

Project: 515 miles of 16-in. from southeast corner of Utah to Jal in southeastern New Mexico.

Status: Field surveys start January 1957.

Union Oil Co. of California.

Project: 45 miles of 12-in. and 180 miles of 16-in. crude and products line from San Joaquin Valley to its Oleum refinery at Rodeo, Calif.

Status: Under way.

Contractor: **Roy Price, Inc.**

Completion: April 1, 1957.

Products Pipelines

• **American Pipe Line Co.**

Project: Line from Gulf Coast to New York City area. Received ODM approval to amortize 40 per cent of $175,000,000 cost with a rapid writeoff.

Status: Proposed.

Buckeye Pipe Line Co.

Project: Conversion of 116 miles of 8-in. crude to products between Huntington, Ind., and Griffith, Ind.

Status: Planned.

Contractor: **Sheehan Pipe Line Construction Co.**

Completion: Fall 1957.

Project: Conversion of 32 miles of 8-in. crude to products between Mantua, Ohio, and Youngstown area.

Status: Planned.

Contractor: Company will do own work.

Completion: November 1957.

• **El Paso Natural Gas Co.**

Project: 11 miles of 4-in. L.P.G. products from Snyder Line to South Andrews Plant, Texas.

Status: Planned.

• **Great Lakes Pipe Line Co.**

Project: 84 miles of 8-in. from south of St. Paul to Eau Claire, Wis.; 68 miles of 12-in. from Great Lakes intersecting point with Badger Pipe Line to Chicago.

Status: Construction scheduled to start spring 1957.

• **Gulf Refining Co.**

Project: 530 miles of 10-in. L.P.G. and natural gasoline line from Waddell Plant in-Crane County, Texas, to Mont Belview near Houston (368 miles is conversion from crude service).

Status: Under way.

Contractor: **Panama-Williams Corp.** has 46 miles from Waddell Plant to Midland. Remainder not let.

• **Northwest Pipeline Corp.** (an affiliate of Pacific Northwest)

Project: 80 miles of 8-in. and 300 miles of 10-in. products and crude line from Four Corners area to Salt Lake City.

Status: To start May 1957.

Completion: August 1957.

• **Ohio Oil Co.**

Project: 350-miles of 12-in. from Wood River, Ill., to Chicago.

Status: Planned. Starting date depends on pipe delivery, which may not be completed until 1958.

• **Southern Pacific Pipe Lines, Inc.**

Project: 100 miles of 10-in., 80 miles of 8-in., and 125 miles of 6-in. between Richmond, Calif., and Fallon, Nev.

Status: Under way.

Contractor: **River Construction Corp.** has 84 miles of 8, 10-in. from Richmond to Stock-

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Pipeline Patrol

ton, Calif. to complete late spring 1957, F. O. Traweek, spread superintendent, office at Richmond. **Hood Constructtion Co.,** Lynwood, Calif., has 58 miles of 10-in. from Stockton to Roseville, Calif. **Engineers, Limited Pipeline Co.** and **Joe E. Young Pipe Line Construction Co.** have 18 miles of 6 and 8-in. between Roseville and Donner Summit.

Completion: August 1, 1957.

- **Union Oil Co. of California**

Project: 815-mile line from Rifle, Colo., to Los Angeles refining area, to carry products from its proposed Rifle shale-oil plant.

Status: Proposed.

Project: 14 miles of 8-in. between Rodeo and Richmond, Calif.

Status: Planned.

Completion: February 1957.

- **Yellowstone Pipe Line Co.**

Project: 22 miles of 8-in. near Spokane, Wash.

Status: Planned.

Completion: March 1, 1957.

Non-Petroleum Pipelines

American Gilsonite Co.

Project: 70 miles of 6-in. from Bonanza, Utah, to Grand Junction, Colo., to carry slurry of gilsonite from mines to refinery now being built.

Status: Under way.

Contractor: **Engineers Limited Pipe Line Co.**

Completion: Early 1957.

Natural-Gas Pipelines

- **Arkansas Louisiana Gas Co.**

Project: Line from Texas-Louisiana coastal region to northern Louisiana, to connect with their present system.

Status: Long-range plans.

- **Carolina Pipeline Co.**

Project: Distribution lines to serve 14 cities in Central South Carolina. Will buy gas from Transcontinental Gas Pipeline Co. or Southern Natural Gas Co.

Status: Has received South Carolina Public Service Commission permit.

- **Cities Service Pipe Line Co.**

Project: 27 miles of 6-in. from Lake Charles, La., to Orange, Tex.

Status: Planned.

Completion: April 30, 1957.

Project. 64 miles of 6 to 30-in. in Leavenworth and Anderson counties, Kansas, Cass County, Missouri. and Oklahoma County, Oklahoma.

Status: Planned.

- **Coastal Transmission Corp.**

Project: 575 miles of 12, 20, 22, 24-in. main line and 414 miles of 2 to 14-in. gathering lines between McAllen, Tex., and Baton Rouge, La.

Status: Has conditional FPC approval.

Completion: January 1, 1958.

- **Colonial Natural Gas Corp.**

Project: Two systems; one between Houston-Lake Charles area and Miami, Fla.; one in the Carolinas and Georgia.

Status: Proposed.

- **Colorado Interstate Gas Co.**

Project: 1957 program . . . 66 miles of 30-in., 40 miles of 34-in., 109 miles of 26-in., and 100 miles of 24-in. from Springfield, Colo., to Pueblo, Colo; 345 miles of 30-in. from Kit Carson, Colo., to Beatrice, Neb.; 50 miles of 22-in. from Laverne to Hooker, Okla.; 24 miles of 22-in. Panhandle field looping.

Status: Pending FPC approval.

- **El Paso Natural Gas Co.**

Project: 338 miles of 34-in. from San Juan and Permian basins to California border.

Status: Under way.

Contractor: **R. H. Fulton Co.** has 102 miles; **Western Pipeline, Inc.,** has 144 miles; El Paso will construct remaining 92 miles.

Completion: April 1957.

Project: 83 miles of 34-in. from San Juan and Permian basins to California border, plus about 800 miles of gathering lines.

Status: Planned.

Fish-Service & Management Corp. (Agent for Cascade Gas Co.)

Project: City distribution system—205 miles of 1 to 8-in. in Washington and Oregon.

Status: Under way.

Contractor: **Ted Price Construction Co.,** Electric, Tex. Three spreads—M. E. Pulliam, spread superintendent, office at Walla Walla, Wash.; K. D. Garrett, spread superintendent, office at Pendleton, Ore.; E. E. Hanks, spread superintendent, office at Baker, Ore.

Completion: March 1957.

- **Houston Texas Gas & Oil Corp.**

Project: 943 miles of 26-in. between Baton Rouge, La., and Miami, Fla., plus 682 miles of sales laterals in Florida, with main line joining Coastal Transmission's proposed line from McAllen, Tex., to Baton Rouge.

Status. Has conditional FPC approval.

- **Iron Ranges Natural Gas Co.,** St. Paul.

Project: 68-mile transmission line and 47 miles of laterals to supply towns on the Mesabi Iron Range, Minn.

Status: Application pending with FPC.

- **Kansas-Nebraska Natural Gas Co.**

Project: 61 miles of various size gathering line in Camerick field, Texas County, Oklahoma.

Status: Approved.

Project: 10 miles of 10-in. between Grand Island and Fullerton, Nebr.

Status: Approved.

Completion: May 1, 1957.

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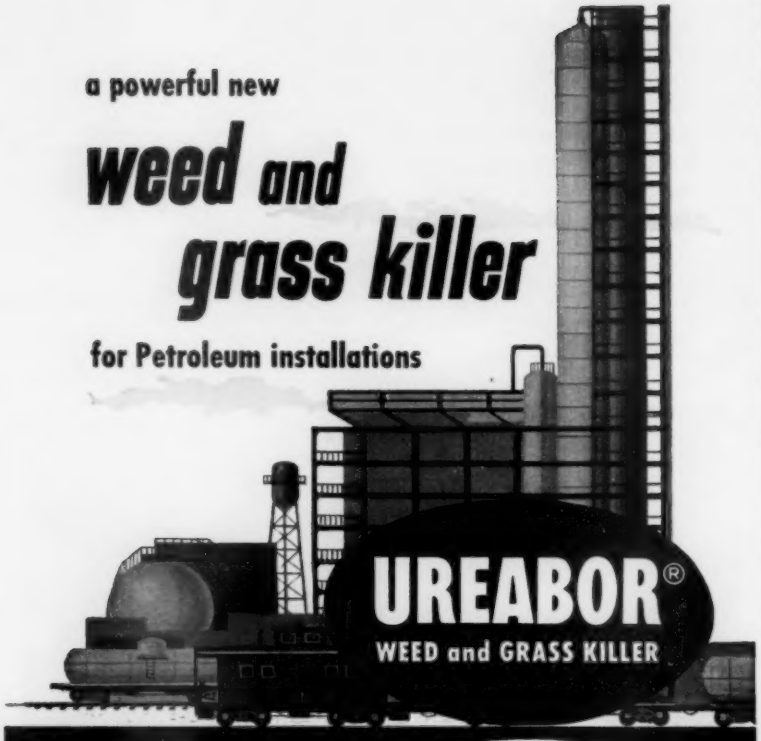

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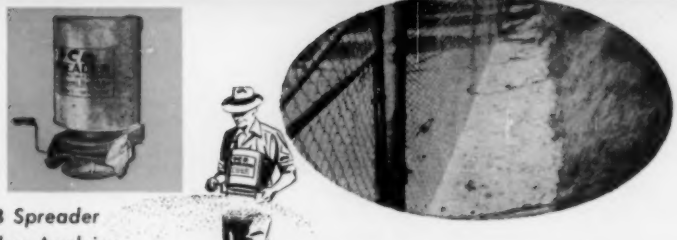

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Pipeline Patrol

Project: 12 miles of 12-in. between Scott City and Colby, Kans.
Status: Approved.
Completion: May 1, 1957.

Michigan Consolidated Gas Co.
Project: 67 miles of 10 and 12-in. between Sears and Travers City, Mich.
Status: Under way.
Contractor: **Somerville Construction Co.**; Floyd Huduall, spread superintendent, office at Cadillac, Mich.
Project: 60 miles of 10 and 12-in. between Muskegon and Ludington, Mich.
Status: Under way.
Contractor: **Somerville Construction Co.**, jointly with **J. L. Gentry Construction**; Frank Morris, spread superintendent, office at Hart, Mich.

- **Michigan Wisconsin Pipe Line Co.**
  Project: 24 miles of 24-in. and 16 miles of 4-in. looping in Michigan, Indiana, Illinois, Wisconsin, Iowa, and Missouri.
  Status: Approved.
  Completion: 1957.
- **Midwestern Gas Transmission Co.**
  Project: Will build main line from Portland, Tenn., to Canadian border near Emerson, Man.; 829 miles of 24-in., 109 miles of 16-in., 174 miles of 12-in., 648 miles of 3 to 18-in. extensions in Minnesota and Wisconsin.
  Status: Application pending with FPC.
- **Mountain Fuel Supply Co.**, Salt Lake City.
  Project: 38 miles of line to connect with Pacific Northwest Pipeline Corp.'s system in Sweetwater County, Wyoming.
  Status: Has temporary FPC permit.
- **Natural Gas Pipeline Co. of America**
  Project: 350 miles of 20 and 26-in. from Jack and Wise counties, Texas, to Fritch, Tex.
  Status: Has FPC approval.
  Project: 389 miles of 36-in. loops along its line from Beatrice, Neb., to Chicago, to take gas from proposed line of Colorado Interstate Gas Co., and for 91 miles of 30-in. loops along parts of its main line.
  Status: Application pending with FPC.
- **North Carolina Natural Gas Corp.** (Subsidary of Colonial Natural Gas Corp.)
  Project: 575 miles of 3 to 16-in. from Transcontinental Gas Pipe Line Corp.'s system near Mooresville, eastwardly across north Carolina.
  Status: Has permit from North Carolina Utilities Commission.
- **Northern Natural Gas Co.**
  Project: 160 miles of 2, 3, 6, 8-in. branch lines to serve 20 new communities on Aberdeen, S. D., line.
  Status: Under way.
  Contractor: **Troth Construction Co.**
  Project: 73 miles of 20-in. from Savana Creek to Pincher Creek fields in Alberta, Canada; 32 miles of 24-in. from Pincher Creek to Montana border; 1,100 miles of 26-in. from Montana into Minneapolis.
  Status: Planned.
- **Offshore Gathering Corp.**, Houston.
  Project: 364 miles in Gulf of Mexico off Louisiana.; 60 miles of 24-in., 70 miles of 26-in., 234 miles of 30-in. (Dual line.)
  Status: Application pending with FPC.
- **Ohio Fuel Gas Co.**
  Project: 7 miles of 12-in. near Fremont, Ohio.
  Status: Planned.
  Completion: First half 1957.
  Project: 23 miles of 18, 20-in. from Gibsonburg to Toledo.
  Status: Uncertain.
  Project: 152 miles of line in Ohio: 38 miles of 24-in. from Crawford Station to Utica; 18 miles of 24-in. from Pavonia Station to Line D; 6 miles of 20-in. from Mount Gilead to Claridon; 4 miles of 20-in. near

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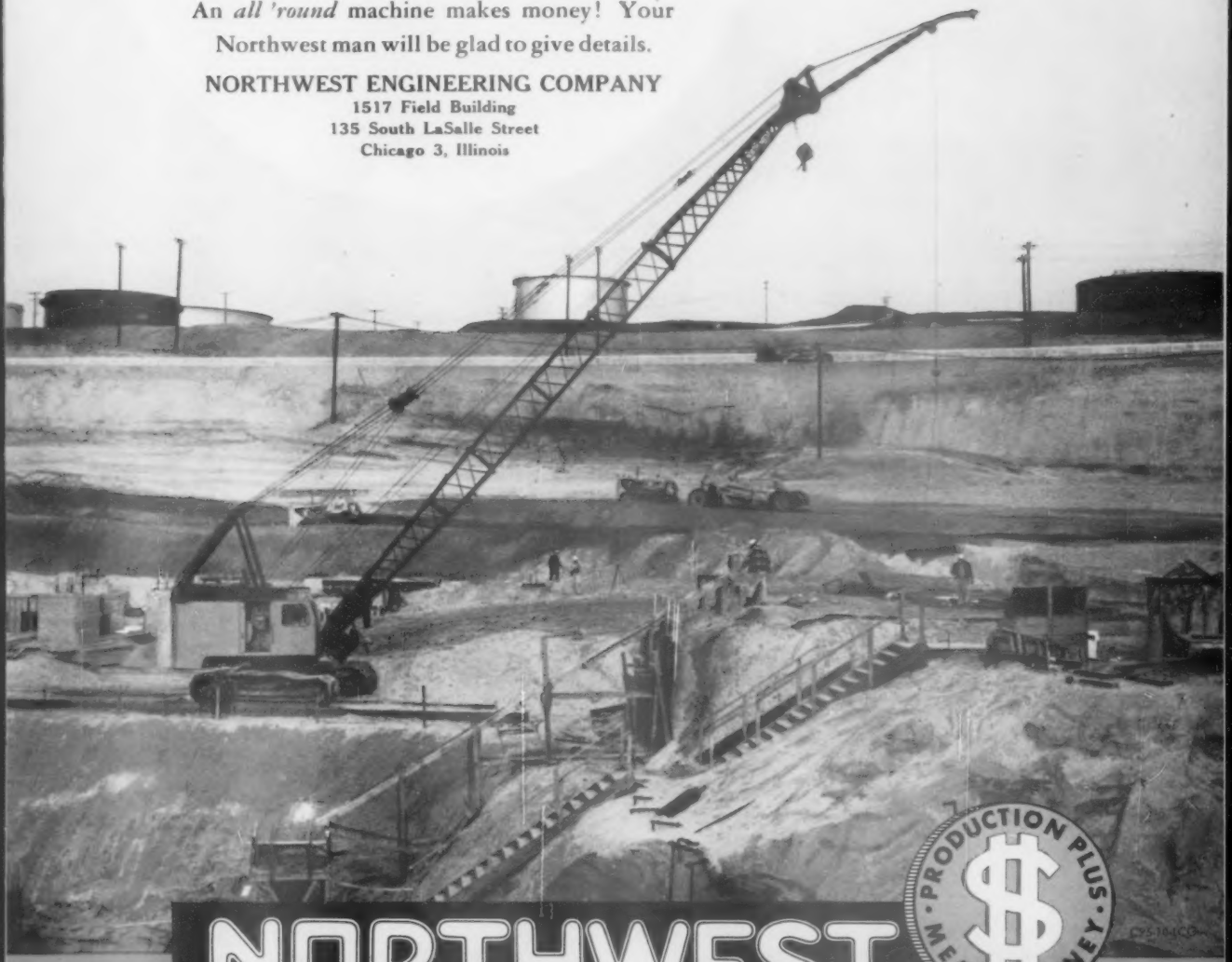

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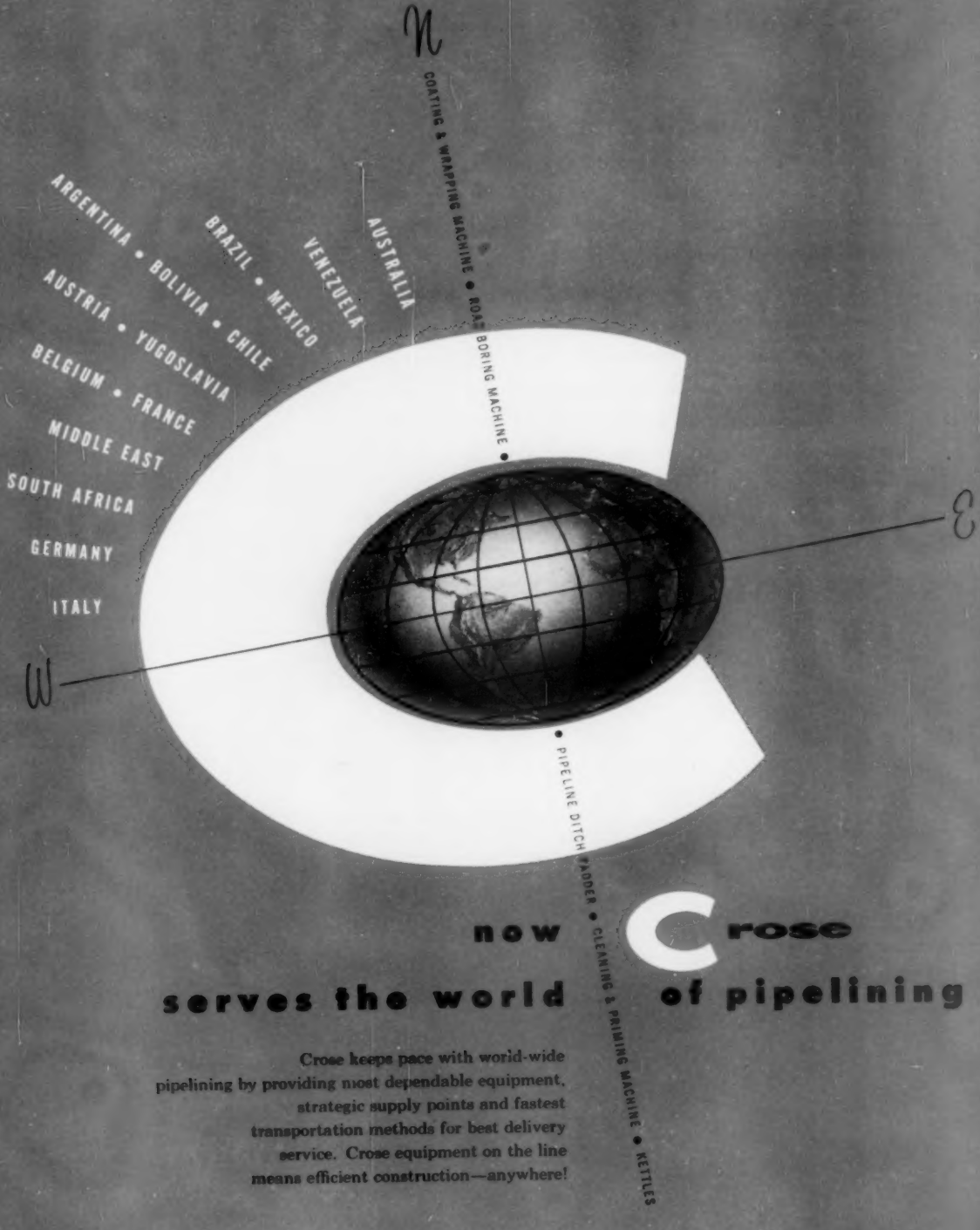

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Pipeline Patrol

Dayton; 4 miles of 20-in. near South Charleston; 7 miles of 16-in. near Springfield; 6 miles of 20-in. nnear Oberlin; 17 miles of 20-in. from Oak Hill to Symmes Station; 7 miles of 12-in. from Mount Sterling to Bloomingburg; 2 miles of 8-in. near Bellefontaine; 3 miles of 12-in. near Mansfield; 4 miles of 12-in. near Lakeville; 7 miles of 8-in. in Guernsey and Belmont counties.

Status: Planned.

Completion: Second half 1957.

• **Pacific Gas & Electric Co.**

Project: 37 miles of 20-in., 37 miles of 18-in., 9 miles of 12-in. from Beehive Bend field near Willows, Calif., to near Davis, then to Sacramento.

Status: Under way.

Contractor: **Engineers Limited Pipeline Co.**

Project: 135 miles of 34-in. looping of the Topock-Milpitas line.

Status: Under way.

Contractor: A joint-venture firm, **Midwestern-Johnson-Dixon,** has 85 miles to complete this year.

Completion: Major part was laid in 1956; 52 miles to be completed in 1957.

Project: 200 miles of 12-in. from Sacramento Valley gas fields to Humboldt County, California.

Status: Has filed for approval of California's Public Utilities Commission. To start early 1957.

Completion: December 1, 1957.

• **Pacific Northwest Pipeline Corp.**

Project: 37 miles of 6-in. from Dove Creek to Nucla, Colo., and 13 miles of 4-in. from Nucla to Urvan, to serve Union Carbide Nuclear Co. and Vanadium Corp. of America.

Status: Has FPC permit.

Project: 1,000 miles of gathering lines and laterals along present line.

Status: Planned.

Completion: 1957.

• **Peoples Natural Gas Co.**

Project: 8 miles of 8-in. between Claysburg and Hollidaysburg, Pa.

Status: Planned.

Completion: August 1957.

• **Permian Basin Pipeline Co.**

Project: 83 miles of 16-in. from its Spraberry station in Midland County, Texas, to tie in with Pioneer Gathering System, Inc., at a point in northwestern Schleicher County, Texas.

Status: Filed for FPC approval.

• **Piedmont Gas Co.,** Hickory, N. C. (Parent is Carolina Natural Gas Corp.)

Project: 78 miles of 2 to 8-in. extension off Trancontinental in North Carolina to serve Gaston, Lincoln, Catawba, Caldwell, and Burke counties.

Status: Application pending with FPC.

• **Pioneer Gathering System, Inc.**

Project: 27 miles of 16-in. and 27 miles of 12-in. in Schleicher and Sutton counties, Texas.

Status: Filed for FPC approval. Estimate to start work March 1, 1957.

Completion: July or August 1957.

Southern California Gas Co. and Southern Counties Gas Co. of California.

Project: 241 miles of 30-in. from the outskirts of Los Angeles to Topock on the Arizona-California border.

Status: Under way.

Contractor: **R. H. Fulton & Co.**

Completion: June 30, 1957.

• **Southern Natural Gas Co.**

Project: 10 miles of 8-in. gathering lines between Napoleonville and Fort Jackson, La.

Status: Pending FPC approval.

Completion: August 1, 1957.

Spokane Natural Gas Co.

Project: 400 miles of 1 through 24-in. distribution system at Spokane.

Status: Under way.

Contractor: **Hallmac Construction Co.;** V. L. Williams, spread superintendent, office at Spokane.

Completion: 1957.

• **Tennessee Gas Transmission Co.**

Project: 221 miles of 30-in., 101 miles of 26-in., and 10 miles of 24-in. looping from Portland, Tenn., to Greenup, Ky.; from Morehead, Ky., to Catlettsburg, Ky.; from Catlettsburg to Broad Run, W. Va.; from New Wilmington, Pa., to Mercer, Pa.; and from New Castle, Pa., to near Pittsburgh, Pa.

Status: Pending FPC approval.

Project: 51 miles of 26-in., 51 miles of 20-in., and 17 miles of 12-in. gathering lines from Kinder, La., to offshore fields in Gulf of Mexico.

Status: Pending FPC approval.

Project: 577 miles of 30-in. from Mississippi River delta area south of New Orleans to Portland, Tenn.

Status: Pending FPC approval.

Project: 76 miles of 24-in. between Coudersport, Pa., and Hamburg, N. Y.

Status: Pending FPC approval.

• **Texas Eastern Transmission Co.**

Project: 422 miles of 30-in. from near McAllen to Beaumont, Tex., to move imported Mexican gas; 45 miles of 24-in. laterals from McAllen to Provident City, Tex., 77 miles of 30-in. looping between Kosciusko, Miss., and Uniontown, Pa.; 147 miles of supply and sales laterals.

Status: Under way.

Contractor: **Houston Contracting Co.** has 121 miles of 30-in. between Angleton and Vidor, Tex., to start March 1, 1957. **H. C.**

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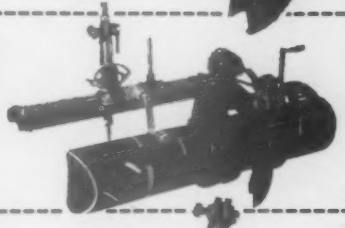

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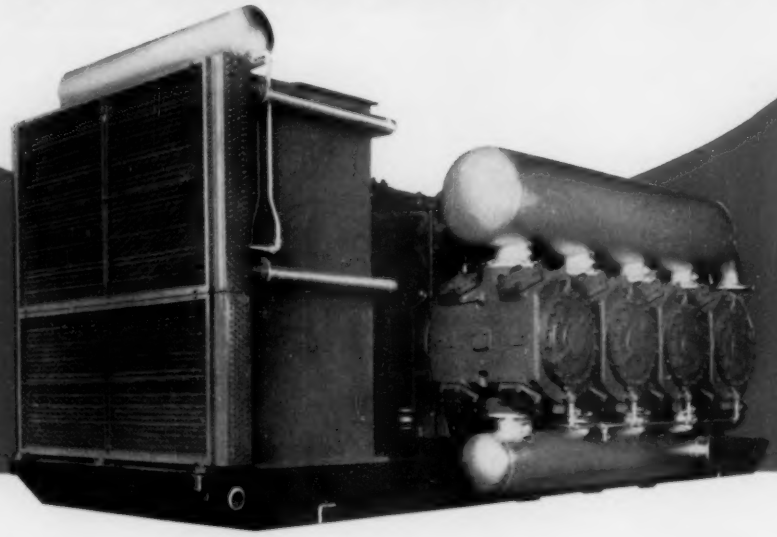

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Pipeline Patrol

Price Co. has 70 miles of 30-in. **H. B. Zachry Co.** has 201 miles of 30-in. starting near McAllen and running northeast to near Angleton, Tex. **Grayco Constructors, Inc.** has 45 miles of 24-in. laterals from Blessing to Provident City. **Western Pipe Line, Inc.,** Austin, has 30-in. crossings at Nueces, Lavaca, and Carancahua bays. **Missouri Valley Dredging Co.,** Omaha, has crossings at Hinds and Guadalupe bays. **Altgelt Construction Co., Inc.,** has 100 miles of 3, 4, 6, 8-in. gathering lines in the Corpus Christi area.

Completion: Fall 1957.

• **Transcontinental Gas Pipe Line Corp.**

Project: 25 miles of 36-in. loops from Louisiana to South Carolina, 31 miles of 36-in. and 43 miles of 30-in. line.

Satus: Pending FPC approval.

United Gas Pipe Line Co.

Project: 48 miles of 20-in. from Deep Lake field to the Lake Charles, La., area.

Status: Under way.

Contractor: **Brown & Root, Inc.**

Foreign Crude-Oil Pipelines

Arabian American Oil Co.

Project: 140 miles of 20-in. from Safaniya field in the Persian Gulf to Ras Tanura, Saudi Arabia, plus an 8-in. gathering system in the gulf.

Status: Under way.

Contractor: **International Bechtel Brothers, Inc.**

Completion: April 1, 1957.

Bolivian Gulf Oil Corp.

Project: 160 miles of 10-in. and 43 miles of 8-in. from Sicascia to Arica on the Chilean coast.

Contractor: **Williams Brothers Co.**

Completion: December 1957.

• **B-A Alberta Pipe Line, Ltd.**

Project: 35 miles of 8-in. to connect Drumheller field, Alberta, with existing lines running to Edmonton.

Status: Pending approval.

• **Interprovincial Pipe Line Co.**

Project: 151 miles of 20-in. to extend present line from Sarnia to Port Credit, Ont.

Status: To start May 1957.

Completion: September 1957.

Project: 33 miles of 24-in. from Kendal to Peebles, Sask.

Status: To start June 1, 1957.

Contractor: **Fulton-Banister, Ltd.**

Completion: July 31, 1957.

Project: 79 miles of 26-in. from Clearbrook, Minn., to Superior, Wis.

Status: To start June 1, 1957.

Contractor: **R. H. Fulton & Co.**

Completion: August 31, 1957.

• **Iraq Petroleum Co.**

Project: About 600 miles of up to 40-in. from Kirkuk field through Iraq and Turkey to the Turkish port of Iskenderun on the Mediterranean sea.

Status: Proposed. Survey completed.

Israeli Government

Project: 125 miles of 8-in. from Elath to Beersheba.

Status: Under way.

Completion: March or April 1957.

• **Mene Grande Oil Co.**

Project: 11 miles of 6-in. from Elias to Fria, and 10 miles of 10-in. from Limon to Leona-Dacion lateral, Venezuela.

Completion: First quarter 1957.

• **North-West Oil Pipelines Co.** (newly formed by six West German refiners, headed by affiliates of Standard Oil Co. (N.J.), and British Petroleum Co., Ltd.)

Project: 210-mile line from the refining centers in the industrial Ruhr area of West Germany to Wilhelmshaven.

Status: Planned.

Completion: 1959.

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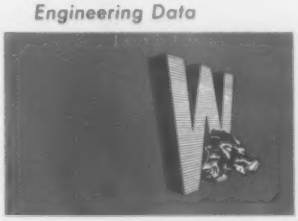

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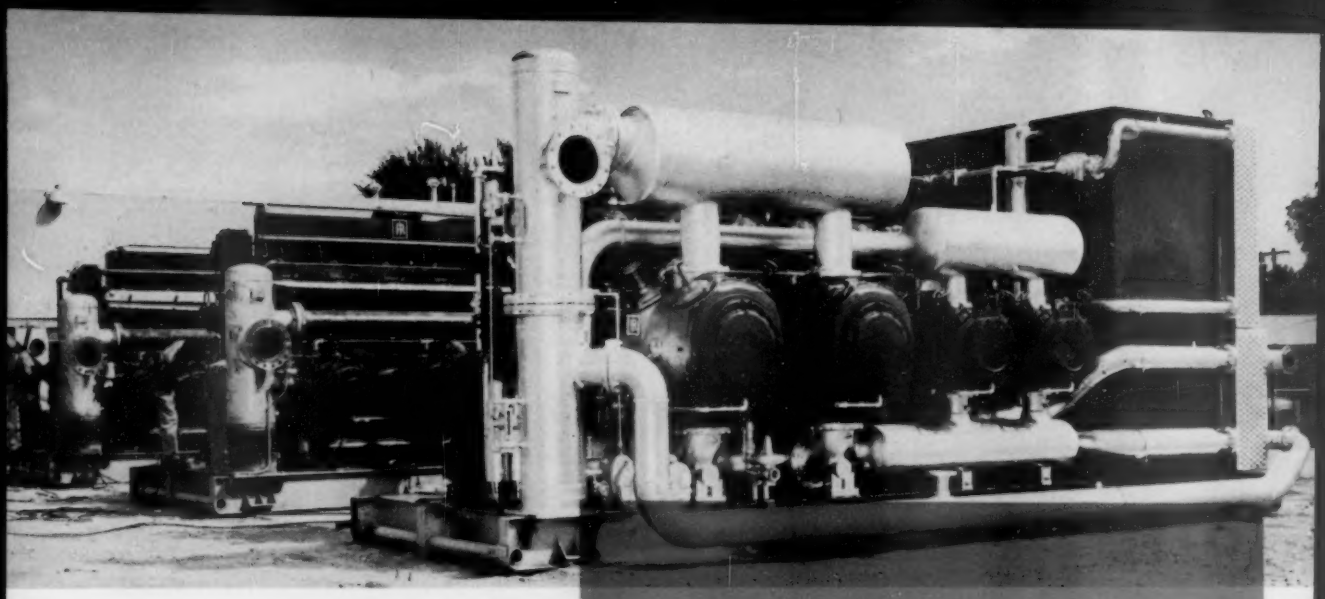

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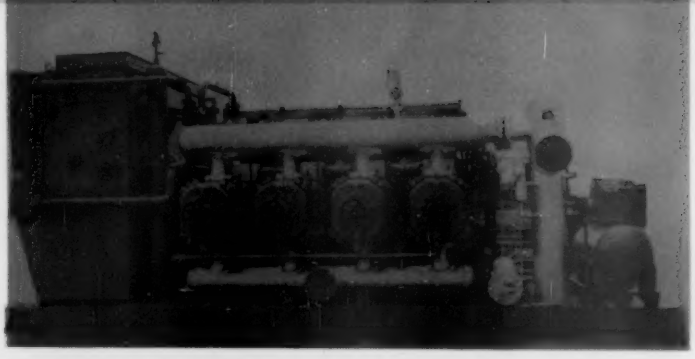

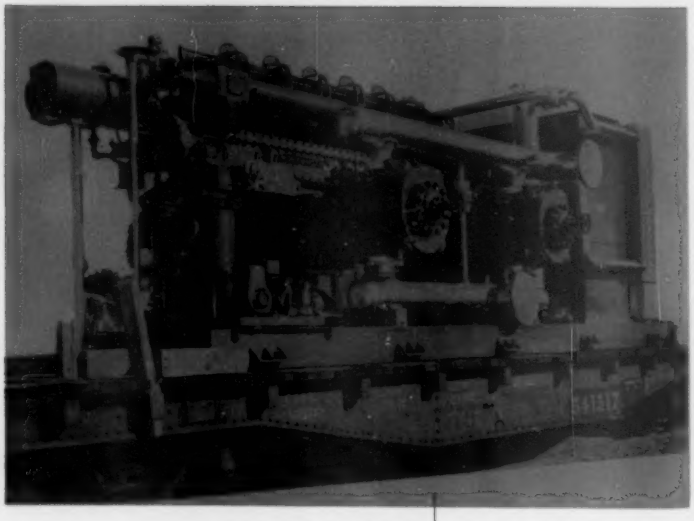

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Pipeline Patrol

Pembina Pipe Line, Ltd.

Project: 100 miles of 3 to 10-in. gathering system in Pembina field.

Contractor: **Sparling Davis Co., Ltd.**

Project: 100 miles of 3 to 12-in. gathering line in Pembina oil field.

Contractor: **Mannix, Ltd.**; T. Childress, spread superintendent, office at Drayton Valley, Alta.

Completion: Fall 1957.

Rangeland Pipe Line Co.

Project: 48 miles of 12-in. between Sundre and the Sylvan Lake in south-central Alberta.

Status: Under way.

Contractor: **Dutton-Williams Brothers, Ltd.**

Completion: August 1957.

• **Royal Dutch-Shell**

Project: 700-mile line across Europe from the Mediterranean to the North Sea, running through Eastern France, Luxembourg, West Germany, and Netherlands, and Belgium. Main trunk to be 30-in.

Status: Company is considering project together with several other companies.

Sinclair Oil Corp. and Socony Mobil Oil Co. Co.

Project: 211 miles of 20-in. from the Silvestre field in Barinas, Venezuela, to Puerto Cabello on Caribbean Sea.

Status: Under way.

Contractor: **Williams Brothers Sudamericano, Ltd.**

Completion: July 1957.

Union of Soviet Socialist Republic

Project: 2,300-mile Trans-Siberian crude and products line from Ufa and the Tuimaza fields in Bashkiria to Irkutsk near Lake Baikal.

Status: Under way.

• **Westspur Pipe Line Co.**

Project: 20 miles of 12-in. from Alida in southeastern Saskatchewan, to the Carnduff-Glen Ewen area to tap Cantal, Hastings, Florence, Carnduff, and Glen-Ewen fields; 34 miles of 4, 6, 8-in. gathering lines.

Status: Planned. Has requested permit from Board of Transport Commissioners.

Yacimientos Petroliferos Fiscales (Argentina)

Project: 932 miles of 12-in. from Campo Duran to San Lorenzo.

Status: Under way.

Contractor: **TECHINT** (Compania Tecnica Internacional), Buenos Aires, has 90 miles.

Project: 497 miles from Mendoza to Buenos Aires.

Status: Proposed. Bids will be taken beginning the end of January 1957.

Foreign Products Pipelines

Hydrocarbons Pipeline Co. (Subsidiary of Canadian Hydrocarbons)

Project: 800 miles of 6 and 8-in. L.P.G. line from near Edmonton, Alta., to Fort William, Ont.

Status: Has permit from Parliament of Canada. If approved by Federal Board of Transport Commissioners and the Alberta Petroleum and Natural Gas Conservation Board, work will start early 1957.

Construction consultants: **Dutton-Williams Brothers, Ltd.**, Calgary, and **A. D. Little & Co.**, Boston.

Imperial Oil, Ltd.

Project: 37 miles of 12-in. from Waterdown to North Toronto, Ont.

Status: Under way.

Contractor: **Majestic Contractors, Ltd.** Odis Hare, spread superintendent, office at Cooksville, Ont.

Israeli Government

Project: A 6-in. line from the Haifa refinery to Tel Aviv.

Completion: Late 1957.

National Iranian Oil Co.

Project: 573 miles of 10-in. from Ahwaz to Teheran, Iran.

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Pipeline Patrol

Contractor: **Enterpose of Paris,** has northern 236 miles. Southern section completed.

• **North Atlantic Treaty Organization (NATO)**

Project: 2,000 miles of lines to airfields in parts of Europe.

Status: Under way.

Contractors: **Associated Pipeline Contractors, Inc.,** has 450 miles from Iskenderun, Turkey, to Batman. **TECHINT** (Compagnia Tecnica Internazionale), Milano, Italy, has 205 miles of 4-in. from Bandirma to Eskisehir, Turkey, and 250 miles of 8-in. from Antalya to Eskisehir. Bids were taken in January 1956 on 300 miles of 12-in. between Marseille and Langres, France. Taking bids on 275 miles in northwestern France: 54 miles of 2-in. from Langres to Mirecourt, 63 miles of 2-in. from Mirecourt to Phalsbourg, 47 miles of 8-in. from Mirecourt to Metz, 30 miles of 8-in. from Phalsbourg to Deux Ponts, 35 miles of 8-in. from Phalsbourg to Strasbourg.

United States Defense Department

Project: Sponsoring 485 miles of 8, 10, 12-in. from Cadiz to Zaragoza, Spain.

Contractors: Prime contractor — **Brown-Raymond-Walsh; Merritt Chapman & Scott, Benson & Montin** of Oklahoma City, **Agroman Construcion Co.** of Spain.

Foreign Natural-Gas Pipelines

• **Alberta Gas Trunk Line Co., Ltd.**

Project: 637 miles of 34 to 16-in. gathering lines in Alberta.

Contractor: **Dutton-Williams Brothers, Ltd.,** has preliminary studies, design and management-engineering. **Mannix, Ltd.,** has crossing of Red Deer River near Cavendish, Alta., J. Hysuick, spread superintendent, office at Empress.

Status: Mannix, Ltd., work to be completed March 1957.

Andes Pipeline Corp. (Subsidiary of Glenn McCarthy, Inc.)

Project: 500 miles of 12-in. from McCarthy's Bolivian concession to the Chile copper-mining area.

Status: Proposed.

Contractor: Will do own work.

• **Attock Oil Co.**

Project: 60 miles of line from Dhulian field to Rawalpindi in West Pakistan.

Status: Planned.

Cia. Shell de Venezuela.

Project: 177 miles of 20-in. from La Paz field in the Maracaibo district, to the Cardon refinery on Paraguana Peninsula, to fuel refinery furnaces.

Status: Under way.

Contractor: **Williams Brothers Co.**

Completion: 1957.

• **Empresa Nacional Del Petroleo.**

Project: 80 miles of 10-in. from Concon to Santiago, Chile.

Status: Planned.

Inland Natural Gas Co., Ltd.

Project: 304 miles of mainline and 25 miles of laterals from Savona to Nelson, B. C.: 150 miles of 12-in.; 112 miles of 10-in.; 67 miles of 6-in. Also will build 400 miles of distribution piping in 31 towns.

Status: Clearing and grading under way.

Contractor: **Dutton-Williams Brothers, Ltd.;** Pat Campbell, project manager, office at Penticton.

Completion: October 1, 1957.

Petroleos Mexicanos

Project: 130 miles of 22-in. to parallel a 14-in. line from Reynosa to Monterrey in northern Mexico.

Status: Planned.

Saskatchewan Power Corp.

Project: 300 miles of 1 to 20-in. distribution system at Regina City.

Status: Will start in 1957.

Contractor: **Fulton Banister, Ltd.**

Completion: October 15, 1957.

South Alberta Pipe Line, Ltd.

Project: 150 miles of 8-in. from Etzikom field to serve a nitrochemical plant to be built near Medicine Hat, Alta.

Status: Filed for permit.

Sui Gas Transmission Co.

Project: 188 miles of 16-in. from Sui gas field to Moultan, Pakistan.

Status: Under way; to be extended later to Lahore with branches at Kot Addu, Jhang Magiana, and Montgomery.

Contractors: **Pakistan Constructors,** a joint company of **Morrison-Knudsen** of Boise, Idaho, and **William Press, Ltd.,** of London

Technical Office of Hydrocarbon, Ministry of Mines and Petroleum, Government of Venezuela.

Project: 207 miles of 26-in. from Anaco fields to Caracas.

Status: Under way.

Contractor: **Fulghum Contracting Corp.** will be consultants; **Petrogas, S. A.** will engineer and construct the line.

Completion: Spring 1959.

• **Trans-Canada Pipe Lines, Ltd.**

Project: 574 miles of 34-in. from the Alberta-Saskatchewan border to Winnipeg. (First part of 2,250-mile line from Alberta to Toronto and Montreal.)

Status: Under way.

Contractors: **Majestic Contractors, Ltd.** (104 miles from Burstall to Stewart Valley, Sask., R. L. Leonard, spread supt., office at Cabri.; **Canadian Bechtel, Ltd.** (110 miles from Swift Current to Moose Jaw, Sask., J. L. Work, general supt., office at Moose Jaw, and 54 miles from Partoze La Prairie to Winnipeg); **Mannix, Ltd.** (90 miles from Moose Jaw to Welseley, spread superintendent, T. Anderson, office at Montmartre, Saskatchewan);

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- **Power-augering equipment and ditching machines were furnished by CSI.**

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Call or write today. Ask also about CSI's engineering services and complete line of name-brand cathodic protection materials.

CSI

CORROSION SERVICES INCORPORATED
Tulsa, Oklahoma

P. O. Box 7343, Dept. J-1 **Telephone: Circle 5-1351**

Pipeline Patrol

Dutton-Williams Brothers, Ltd. (97 miles from Deveren to Moosomin, under way, to complete August 1957). **Price-Poole of Canada, Ltd.** has 100 miles from Miniota to near McGregor to start in 1957.

Completion: Late summer 1957.

Union of Soviet Socialist Republic.

Project: 900 miles of 26-in. from Stavropol in the Northern Caucasus to Moscow. The line, larger than Russia's other two major gas lines which are only 16 and 18-in., will serve Voroshilovgrad, Voronezh, Tula, Yelets, and Serpukhov.

Status: Under way; approximately 50 per cent completed.

- **Westcoast Transmission Co., Ltd.**

Project: 650 miles of 30-in. from Peace River area, Canada, to Sumas, Wash.

Status: Under way. About two-thirds completed.

Contractors: **Dutton - Williams Brothers, Ltd.,** has 120 miles from Taylor, B. C., to Azouzetta Lake, completed; **Mannix, Ltd.,** has 110 miles between Huntingdon and Merritt, G. Lyons, spread superintendent, office at Hops, B. C.; **Canadian Bechtel, Ltd.,** has 210 miles from Alexandria to Pine Pass, B. C., H. F. (Hank) Mogg, spread man, office at Quesnel, B. C.; **R. A. Conyes Construction Co.,** has 210 miles; **River Construction Corp., Ltd.,** has under way 150 miles of gathering lines in northern Alberta and British Columbia; **Marine Pipeline & Dredging, Ltd.,** has Fraser and Peace River crossings.

Completion: Dutton-Williams section completed. R. A. Conyes section and Canadian Bechtel section to be completed September 1957. Marine Pipeline work to be completed April and May 1957.

Project: 174 miles of 30-in. from Savanna Creek area to the Canadian-Idaho border.

Status: Planned.

- **Yacimientos Petroliferos Fiscales (Argentina)**

Project: 1,556 miles from Campo Duran to Buenos Aires.

Status: Proposed. Bids will be taken beginning the end of January 1957.

BOOKS

SECOND ANNUAL ROCKY MOUNTAIN MINERAL LAW INSTITUTE. Published by Matthew Bender & Co., Inc., Albany, N. Y. $16. May be ordered for 2 weeks' free approval.

Seventeen specialists, of Rocky Mountain Mineral Law Foundation, give their methods in legal and tax problems. Covers Gas Conservation Problems, Looking Ahead at Atomic Law, Valuation of Oil and Gas Properties in Estates and Trusts, Establishing the Drilling Unit, Mineral Reservations by Railroads and Municipalities, Mineral Reservations Underlying Easements, Indian Lands—How to Proceed, Land Withdrawals by A. E. C., Implied Lease Covenants, The Mining Lease, Conveyances and Reservations of Hard Rock Minerals, Federal Unitization, Co-ownership of Mining Property, Techniques of Evaluating Oil Properties, Ad Valorem Taxation of Mineral Interests, Decisions and Problems in the Regulation of Independent Gas Producers, Tax Treatment of Joint Operations.

THE PUSH-BUTTON WORLD. Edited by E. M. Hugh-Jones. Published by University of Oklahoma Press, Norman, Okla. 158 pp. $3.75.

The public knows little about the implications involved in the revolution of automation. In this beek, seven noted analysts examine automation as a method, in engineering production, its scientific bases, as it affects labor, the ways in which it may be applied to administration, and its social implications.

The editor makes some provocative comparisons between the Industrial Revolution which began more than a century and a half ago and the Second Industrial Revolution which is being ushered in by automation.

This new revolution of industry has developed a new time scale measured in thousondths of a second or less, and this is much shorter than the old human time scale. The bearing of this startling fact upon the size of factories, the length of the work week, and the mental standards required of labor is an important aspect of this book.

FORMATION EVALUATION SYMPOSIUM (1955), published by the Gulf Coast Section, A.I.M.E. $5. Available from H. M. Krause, Humble Oil & Refining Co., P. O. Box 2180, Houston, Tex.

OIL AND GAS DEVELOPMENTS IN KANSAS DURING 1955, by E. D. Goebel, A. L. Hornbaker, W. R. Atkinson, and J. M. Jewett. Published by the State Geological Survey of Kansas, Bulletin 122. 250 pp.

The annual survey of oil and gas developments in Kansas is now available for the year 1955, from the State Geological Survey of Kansas. This is a complete summary of petroleum developments in the state for the year. Each county in the state is treated.

The report contains valuable tables covering oil and gas production in the state and significant developments during 1955. A complete bibliography is included.

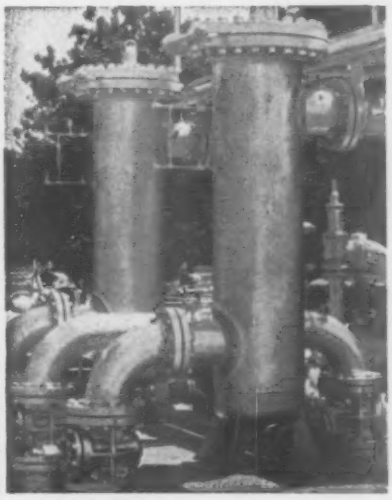
Note: The Oil and Gas Journal maintains a book department. Write to the READER SERVICE DEPARTMENT, P. O. Box 1260, Tulsa 1, for copies of the book list. Often books reviewed here may be purchased from this source.

MOORLANE

GAS SCRUBBERS

AN ESSENTIAL ACCESSORY

FOR ALL GAS PIPE LINE SYSTEMS



Sizes available are 4-inch through 18-inch diameter vessels for any working pressure.

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Capacity — up to 34,000,000 standard cubic feet per day.

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Scrubber is dry type. No oil carry-over to worry about.

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Filter medium is wool felt.

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Efficiency remains constant from very low flows to extremely high volumes.

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Low initial cost.

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Inexpensive to operate and maintain.

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Removes all particles 5 microns (.0002″) in size, and larger.

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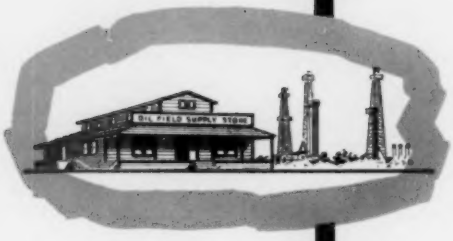


BONUS FOR DRILLING CONTRACTORS

That's what your Goodall rotary hose is — a bonus for drilling contractors. Twenty years ago the Barney Coupling was developed by Goodall and today it is still the only coupling which can be re-set to make damaged hose as good as new. This means a bonus for you in that a Goodall hose when damaged can have the couplings re-set by the Goodall repair service for future use as rotary hose or in shorter lengths as vibrator hose.

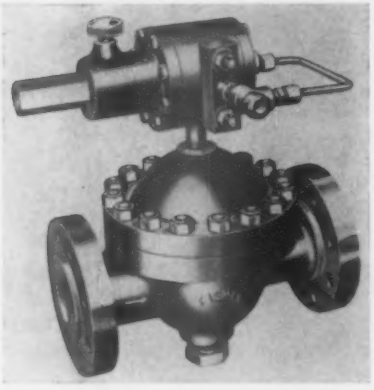
The Barney Coupling, while it is probably the greatest single development in rotary hose manufacture, is only part of your bonus when you buy Goodall rotary hose. You also get the exclusive Goodall guarantee, the Goodall Safety Clamp and the Goodall repair service.

GOODALL RUBBER COMPANY

TRENTON, N. J.

GOODALL RUBBER COMPANY OF TEXAS, Houston, Odessa, San Angelo, Texas.
GOODALL RUBBER COMPANY OF CALIFORNIA: San Francisco, Los Angeles, Seattle, Salt Lake City, Portland.
GOODALL RUBBER COMPANY: New York, Philadelphia, Pittsburgh, Chicago, Denver, St. Paul, Detroit.
EXPORT: Goodall Rubber Company, Trenton, N. J.
STOCKING DISTRIBUTORS: Texas and Louisiana—Houston Oil Field Material Co., Wilson Supply Co., Hunt Tool Company, Heap Equipment Co., Iverson Supply Co.

The OIL AND GAS JOURNAL Showcase



Relief Valve Provides Service From 10 to 600 Psi.

This new relief valve has only one moving part in the main valve, the rubber diaphragm. The diaphragm flexes to open or close the valve. Known as the Dia-Grid, this pilot-operated relief valve provides positive shutoff operation. It is compact, accurate, and easy to maintain. It is available in 2, 4, 6, and 8-in. connections with flange ratings of 150, 300, and 600 psi.

A pilot for use with the Dia-Grid for safety relief service can be adjusted for relief ranges from 10 to 600 psi. **Write or call Fisher Governor Co., Marshalltown, Iowa, for more information on the Dia-Grid relief valve.**

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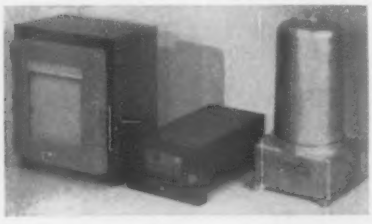
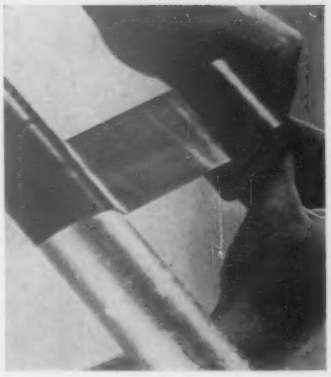


New Process Chromatograph Uses Elution Method

A new automatic vapor-phase chromatograph operates in hazardous areas. The instrument consists of two units: (1) the analyzer which is designed for use at the sample point in the plant or other hazardous locations; and (2) the control unit which may be located as much as 500 ft. away from the analyzer.

The instrument makes use of the elution method of vapor-phase chromatography. The analyzer unit, in a cast-aluminum housing, includes the chromatograph column, the detector, sampling valve, and the flow-control system for the carrier gas. The control unit contains the electrical components including the timing mechanism that operates the analyzer and receives the signal from the detector.

The sampling valve introduces sample volumes reproducible to better than ±0.5 per cent. Sample and column temperatures are controlled to ±0.5 per cent. Carrier-gas flow-rate variations are held to ±0.05 per cent. **Write or call Consolidated Electrodynamics Corp., 300 North Sierra Madre Villa, Pasadena, Calif., for more information on the Type 26-202 process chromatograph.**



Pipe-Wrap Tape Requires No Heat, Made of Polyethylene

New Safe-T-Clad tape extruded of Tenite polyethylene impedes pipe corrosion. The polyethylene material permits little moisture absorption or penetration. The tape resists electrolytic attack and microbiological deterioration.

Send this *Showcase Coupon* to the **Manufacturer** of the item in which you are interested. See name, address, and equipment name and/or model, in boldface type at end of description.

• • •

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Described in The OIL AND GAS JOURNAL - Issue of Feb. 4, 1957

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____

DATE _____

New QUAKER hose for hot air ducting cuts heat loss up to 57%

Synthetic fabric jacket and silicone tube retain temperatures from upstream to downstream end

Made in continuous lengths up to 50′, this new Quaker hose easily withstands temperatures as high as +450°F; as low as −80°F.

As the above diagram shows, the hose keeps heat loss—and therefore energy loss—to a minimum. (Comparable outside temperature of ordinary hot air ducting material, such as stainless steel, would be about 400° F.). Both the silicone tube and the synthetic fabric jacket of Quaker's new hose hold the heat!

Other advantages? The hose is lightweight and fully flexible. And it resists abrasion.

Available in either single or double jacket, the hose comes in 1″ to 4″ I.D.'s. Sizes 1″ and 1¼″ I.D. can be made in 30′ continuous lengths; 1½″ to 4″ I.D. in 50′ lengths. The hose takes regular expansion and shank hose couplings.

Want more information? Write to: ***H. K. Porter Company, Inc. Quaker Rubber Division, Philadelphia 24, Pa. or Quaker Pioneer Rubber Division, Pittsburg, Cal.***

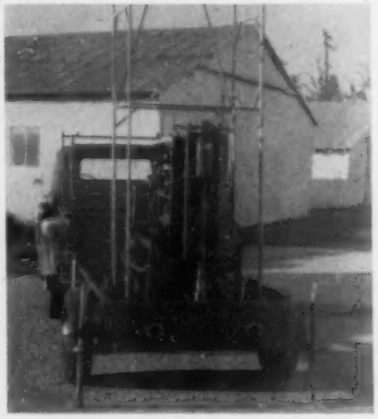
HKP QUAKER RUBBER DIVISION
QUAKER PIONEER RUBBER DIVISION
H. K. PORTER COMPANY, INC.

and does not leach out when buried in the earth.

It is easy to apply by either manual or mechanical means. No special conditioning, as with heat, is required. A noncorrosive adhesive compound that is bonded to one side of the polyethylene makes it ready to use. Wrapped spirally on pipe, with proper tension, it gives a tight, firm coating.

Safe-T-Clad tape is available in 100-ft. rolls in widths of 1, 2, 4, or 6 in. **Write or call: F.O.S. Industrial Tape Division, The Seamless Rubber Co., New Haven 3, Conn., for more information on Safe-T-Clad tape.**

●



Core Drill Used for Air or Mud Drilling

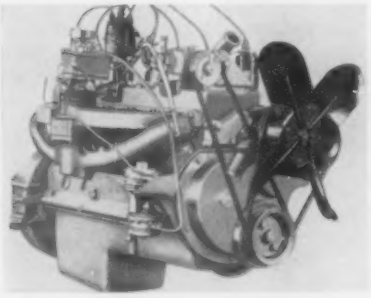
The new Adco 1000 hydraulic core drill is a portable unit for low-cost shallow oil or mineral exploration, and water-well and oil-test drilling. This drill is powered with a two-cylinder, 14-hp. Wisconsin engine for drilling to 1,000 ft., or may be used with a 30-hp. engine for drilling to 3,500-ft. depths.

It is capable of drilling up to 3-in. diameter holes with diamond core, insert, for roller bits on 1⅛-in. standard E rod. It provides controlled hydraulic down-pressures from 0 to 1,500 lb. and a 28-in. stroke. The drill is of all-steel construction with a hydraulic valve controlling speed and direction. It is equipped with easy-to-reach controls, adjustable relief valves, and a four-speed transmission.

It is field tested and can be used for air drilling. It uses a 60 to 125-cu.-ft. compressor. In mud drilling, it uses a simplex pump and recirculating slush tank. The drill weighs 1,000 lb.

and is commonly skid-mounted for easy portability. It may be permanently truck-mounted. **Write or call Allied Drilling Co., 3606 Luca Street, Houston, Tex.**

●



Industrial Engine Produces Up to 65 Hp.

A new six-cylinder engine for industrial use produces high torque at low speeds. Valves of the engine are hard-faced with Stellite or Eatonite. The same hard facing is on the valve inserts. Pistons are made of aluminum alloy and the forged crankshaft is counterweighted.

The engine has a 226-cu. in. displacement. It produces a continuous horsepower of 33 and maximum continuous torque of 143 at 1,200 r.p.m. It provides a continuous horsepower of 65 and a maximum continuous torque of 132 at 2,600 r.p.m. **Write or call Willys Motors, Inc., Industrial Engine Dept., Toledo, Ohio, for more information on the Jeep six-cylinder industrial engine.**

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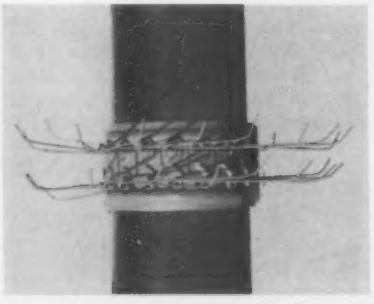
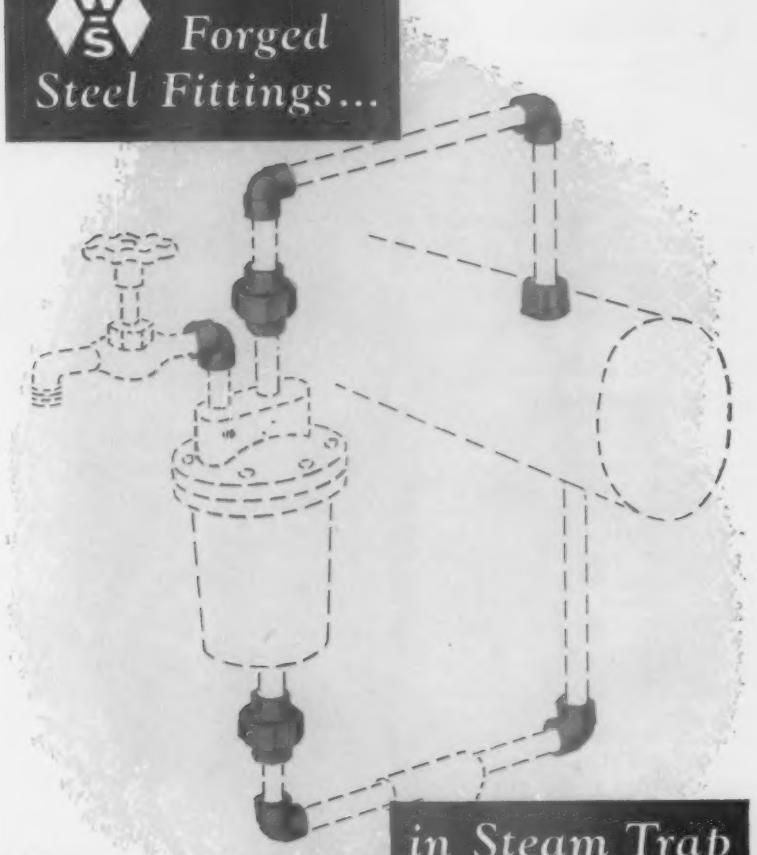


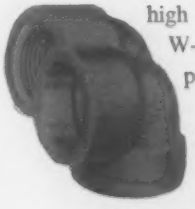
Scratcher Doesn't Stir Up Gelled Mud in Casing

Straight-wire scratchers cause agitation of gelled mud and mud filter cake when casing is run into a well. Now, hinged or solid Nu-Coil scratchers are made with upturned wires to help avoid

W-S Forged Steel Fittings...



Standouts in Steam Trap Installations



W-S Forged Steel Fittings are a familiar sight around steam trap installations . . . especially when it's high pressure steam. Drop-forged from high strength steel, W-S Fittings readily resist stresses due to pressure, heat, shock and vibration. The W-S line includes 2000, 3000 and 6000 lb. fittings, 3000 lb. forged steel unions, stainless and alloy steel fittings and the new W-S Couplets for connecting to tanks and pipelines. Both screw-end and socket-welding fittings are available to meet your installation requirements.

Ask for our new Forged Steel Fittings Catalog A-3.

Write to Dep't A, W-S Fittings Division,
H. K. Porter Company, Inc., P.O. Box 95, Roselle, N. J.

HKP W-S FITTINGS DIVISION
H. K. PORTER COMPANY, INC.

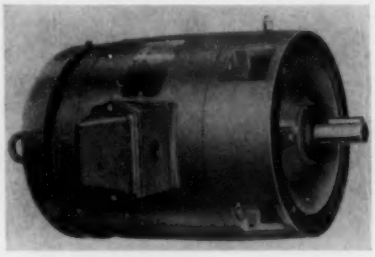
this agitation. Scratching is prevented when casing is lowered or until circulation has been established and the casing is reciprocated. **Write or call B. & W., Inc., Box 5266, Houston 12, Tex., for more information on Nu-Coil scratchers.**

●

Shaker Uses Desander to Protect Drill Tools

The Rumba shale shaker is fitted with a desander and a sample catcher. The desander traps droplets of water which contain particles of sand. This prevents the particles from mixing with drilling mud. Sand in the mud cuts and wears drilling tools. Two shale shakers can be mounted side by side on skids. One or both of the shakers can be used. Dual installations are used on many drilling barges.

The British manufacturer, licensed by Hutchison Mfg. Co., Avenue U, Houston 11, Tex., manufactures and stocks the shakers, spare parts, and supplies. **Write or call Niagara Screens (Great Britain) Ltd., Enfield, Middlesex, England, for more information on the Rumba shale shaker.**



Motor Line Designed for Indoor or Outdoor Use

A line of totally protected, vertical solid-shaft P-base motors has normal thrust bearings in all sizes from 1 to 40 hp. and high-thrust bearings in sizes from 1 to 15 hp. They are available in protected, totally enclosed, or explosionproof enclosures. The standard enclosure for explosionproof P-base motors meets Underwriters' Laboratories specifications for performance under conditions covered by Class 1, Group D, and Class 2, Groups E, F, and G.

Designed for indoor and outdoor installations, all of the new P-base motors are corrosionproof for long, safe operation under adverse conditions usually found in the process industries. The shaft is sealed by a neoprene slinger that protects bearings and windings from foreign matter. The mounting-flange face and rabbet fits are machined after assembly to assure perfect mating with the pump flange and to provide positive shaft alignment for quiet, long-life operation. Metermatic lubrication automatically regulates the correct flow of lubricant to the bearings. Automatic grease relief prevents bearing damage from grease pressure or over lubrication. **Write or call Reliance Electric & Engineering Co., 1088 Ivanhoe Road, Cleveland 10, Ohio, for more information on totally protected, vertical solid-shaft P-base motors.**

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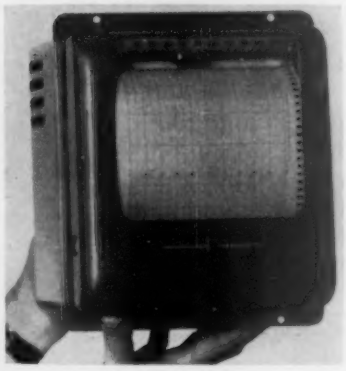

Strip-Chart Recorder Adjusts From 9 to 100 Mv.

This self-balancing strip-chart recorder records within a limit of error of 1 per cent. It provides a full-scale balancing time of 1 second. The new G-11 was designed for use in laboratory, plant, and field applications.

It is suitable for panel mounting, relay-rack mounting, or portable use. The measuring circuit is unitized. The potentiometer model has behind-the-panel span adjustment to any value from 9 to 100 mv. Source resistances as high as 100,000 ohms are permissible. **Write or call Varian Associates, Instrument Div., 611 Hansen Way, Palo Alto, Calif., for more information on the G-11 strip-chart recorder.**

●

New Nontoxic Solvents Are Rated Nonflammable

New nonflammable solvents will bite into and remove oil, grease, and dirt without harming delicate metal parts or electrical insulation. Yet they are safe enough to use in ordinary work areas with conventional ventilating equipment. The solvents are adaptable to vapor degreasing or cleaning by liquid

Send this *Showcase Coupon*
to the **Manufacturer** of the item in which you are interested. See name, address, and equipment name and/or model, in boldface type at end of description.

• • •

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Described in OIL AND GAS JOURNAL - Issue of Feb. 4, 1957

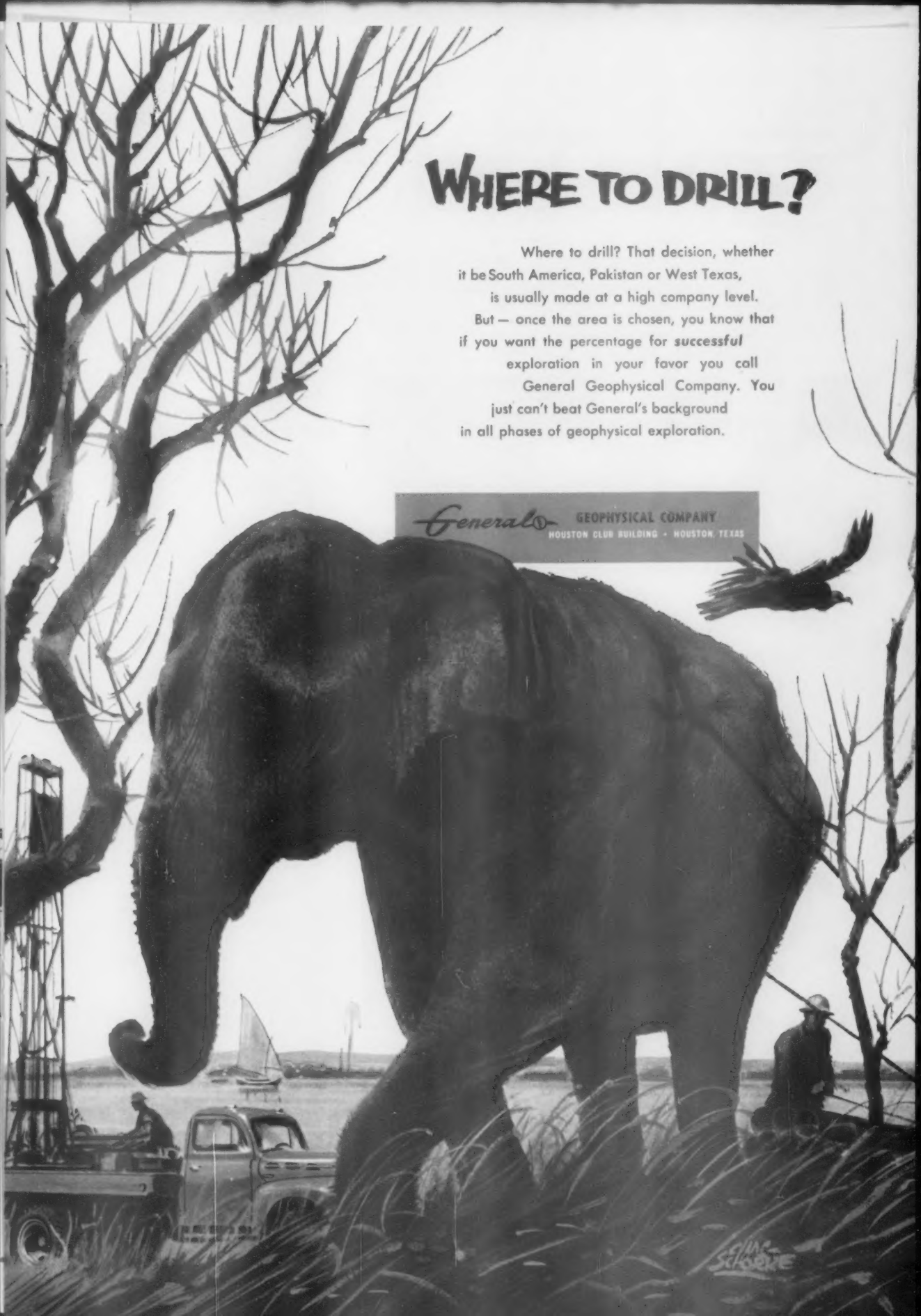
NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____

DATE _____


WHERE TO DRILL?
Where to drill? That decision, whether it be South America, Pakistan or West Texas, is usually made at a high company level. But — once the area is chosen, you know that if you want the percentage for *successful* exploration in your favor you call General Geophysical Company. You just can't beat General's background in all phases of geophysical exploration.
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SCHORRE

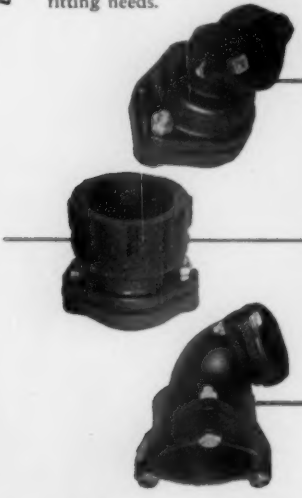
immersion. Three types are technically classified as selective solvents.

The big advantage of the Freon solvents rests in their safety, both from a personnel exposure and material standpoint. Because they are nonflammable and nonexplosive, they can be used in open-shop areas without danger of fire. In addition, from an inhalation-toxicity standpoint, they are rated as the safest for the commonly used nonflammable solvents when used in properly designed equipment which minimizes vapor losses. **Write or call E. I. du Pont de Nemours & Co., 7506 Nemours Building, Wilmington, Del., for more information on Freon nonflammable solvents.**

YOU JUST CAN'T BEAT
SLIP-ON'S*!

You can accomplish maximum economy by using Enardo **SLIP-ON** fittings for all low pressure fitting installations. Some users have reported a 50% savings in time and money because of their labor saving qualities. No unions are needed with Enardo **SLIP-ON** fittings, which means easier, faster, and cheaper lease installations.

Consult your Enardo salesman or call the Tulsa office for your own particular fitting needs.



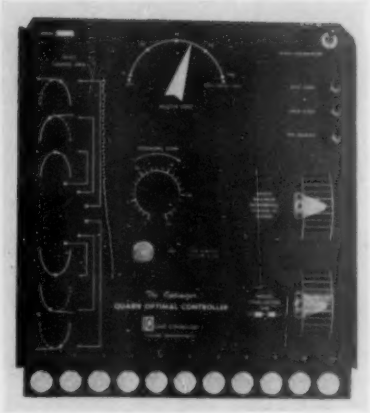
4" to 3" and 4" to 2" **SLIP-ON** 45° reducer ells. Principally designed for use in equalizer line installations.

4" N.P.T. to 3" **SLIP-ON** reducer connections. For connections between screwed end pipe and blank end pipe. Also used for water-leg installations.

6" to 4" **SLIP-ON** 90° reducer ell. General purpose fitting for installations where working pressures do not exceed 150 p.s.i.

*Reg. T. M.

ENARDO manufacturing company
BOX 1661 • TULSA, OKLAHOMA



Optimal Controller Gives Cost Information

A new process controller automatically maintains the optimum-performance of a system regardless of external conditions that might change. An example is the control of fuel-flow to a furnace to maintain the most economical rate.

The controller makes use of the slope of the operating curve of the process system as the control parameter. By suitable choice of coordinates the slope will have dimensions such as pounds of steam per pounds of fuel. The controller maintains the best value even though the steam pressure and fuel rate change. **Write or call Quarie Controllers, Canton, Mass., for more information on the optimal controller.**

●

Plastic-Pipe Fitting Uses New Solvent Weld

A paper-thin layer of plastic on a section of the inside wall of a new pipe fitting stops leaks at joints in cemented, or solvent-welded plastic-pipe installations. The plastic layer, only a few thousandths of an inch thick, makes the inner half of the fitting slightly smaller than the outside diameter of the pipe it is used to join. But a light coat of solvent-base cement on the inside of the fitting and on the pipe end softens the plastic layer—the pipe can be pushed snugly into place.

High-contact pressure between pipe and fitting causes a positive weld. Within seconds this weld is strong enough for ordinary handling, and in about 2 hours the solvent-softened plastic in the weld area has hardened so the joint is as strong as the pipe itself.

The new fittings, called Uscoweld, are made of a styrene-acrylonitrile blend. It is a tough, lightweight plastic with good corrosion resistance. The

Important Cementing Data--Clip and save for your files!

Use Strata-Crete 6 ®

TRADEMARK

for less WOC *time on CONDUCTOR,*

(WAITING ON CEMENT)

SURFACE, and SHALLOW casing jobs!

The results will be:

AMPLE STRENGTH, LESS LOSS OF SLURRY, LOW FILLUP COST

STRATA-CRETE 6

Recommended Water and Calcium Chloride Additions for Surface Pipe Applications

ASTM—Type 1—Portland Cement—100° F.

24-Hour Compressive Strengths exceed 500 psi for all mixes shown (except as noted by **).

Cu. Ft. S.C.–6/Sack Cement	Ft. Depth	Percent Gel*	Water Gal./Sack	Atm. Weight Lbs./Gal.	Depth Weight Lbs./Gal.	Slurry Vol. Cu. Ft./Depth	Final Setting Time Percent Calcium Chloride 0	2	4
1	0	2	10.5	12.55	12.55	2.41	6:35	4:41	4:05
1	0	4	12.1	12.35	12.35	2.64	12:00**	11:42	10:22
1	500	2	11.0	12.42	12.80	2.41	6:35	4:41	4:05
1	500	4	12.6	12.23	12.50	2.64	12:00**	11:42	10:22
1	1000	2	11.4	12.35	12.95	2.41	6:35	4:41	4:05
1	1000	4	13.0	12.18	12.70	2.64	12:00**	11:42	10:22
1	1500	2	11.6	12.30	13.05	2.41	6:35	4:41	4:05
1	1500	4	13.3	12.12	12.80	2.64	12:00**	11:42	10:22
1	2000	2	11.8	12.25	13.15	2.41	6:35	4:41	4:05
1	2000	4	13.4	12.10	12.80	2.64	12:00**	11:42	10:22
½	0	2	8.5	13.30	13.30	1.89	6:30	3:50	3:40
½	0	4	9.9	13.20	13.02	2.09	10:37	10:35	8:22
½	500	2	8.75	13.21	13.45	1.89	6:30	3:50	3:40
½	500	4	10.2	12.93	13.10	2.09	10:37	10:35	8:22
½	1000	2	9.0	13.18	13.62	1.89	6:30	3:50	3:40
½	1000	4	10.4	12.87	13.20	2.09	10:37	10:35	8:22
½	1500	2	9.1	13.10	13.70	1.89	6:30	3:50	3:40
½	1500	4	10.5	12.84	13.30	2.09	10:37	10:35	8:22
½	2000	2	9.2	13.08	13.72	1.89	6:30	3:50	3:40
½	2000	4	10.6	12.82	13.30	2.09	10:37	10:35	8:22
⅓	0	2	7.83	13.70	13.70	1.71	6:00	3:30	3:05
⅓	0	4	9.2	13.38	13.38	1.90	9:52	9:41	8:00
⅓	500	2	8.0	13.61	13.80	1.71	6:00	3:30	3:05
⅓	500	4	9.3	13.35	13.40	1.90	9:52	9:41	8:00
⅓	1000	2	8.2	13.57	13.93	1.71	6:00	3:30	3:05
⅓	1000	4	9.5	13.28	13.50	1.90	9:52	9:41	8:00
⅓	1500	2	8.2	13.57	13.93	1.71	6:00	3:30	3:05
⅓	1500	4	9.6	13.25	13.60	1.90	9:52	9:41	8:00
⅓	2000	2	8.3	13.53	14.00	1.71	6:00	3:30	3:05
⅓	2000	4	9.6	13.25	13.60	1.90	9:52	9:41	8:00

*Based on weight of cement

Strata-Crete 6 is available through leading oil well cementing service companies.

For complete technical information on Strata-Crete 6, write to

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Great Lakes Carbon Corporation

Perlite Division - Strata Products Department

P. O. BOX 2050 - HOUSTON, TEXAS

same material is used in Uscolite pipe and Uscolite screw fittings.

A range of Uscoweld fittings for standard-size pipe from ½ to 2 in. in diameter is now available. **Write or call United States Rubber Co., 1230 Avenue of the Americas, New York 20, for more information on solvent-welded plastic-pipe fittings.**

New Drainage Pumps Have to Check Valves, Prime Easily

A new line of pumps is designed to reduce self-priming drainage-pump failures. The Series 80 centrifugal pump eliminates the check valve. It features straight-in suction with pumped liquid entering directly at the eye of the impeller.

The check valve is the most common cause of pump failure. Solids and foreign material are often drawn up with the liquid. The valve becomes fouled, fails to seat properly, and the repriming fails. When the Series 80 pump is shut off, the absence of a check valve permits in-line liquid to return by gravity from the suction and upper-pump sections to the pumping source. This fast, self-emptying advantage is controlled in larger sizes by a restrictor device in the interest of safety and quicker priming.

The Series 80 line includes pumps from 1½ to 8-in. sizes. **Write or call: Gorman-Rupp Co., Mansfield, Ohio, for more information on the Series 80 centrifugal pumps.**

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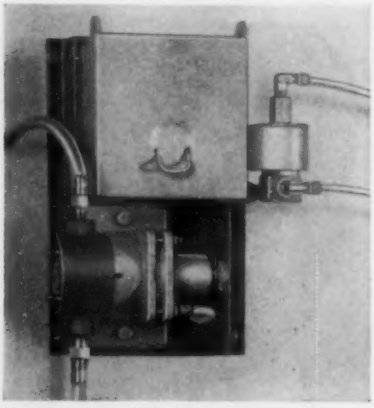
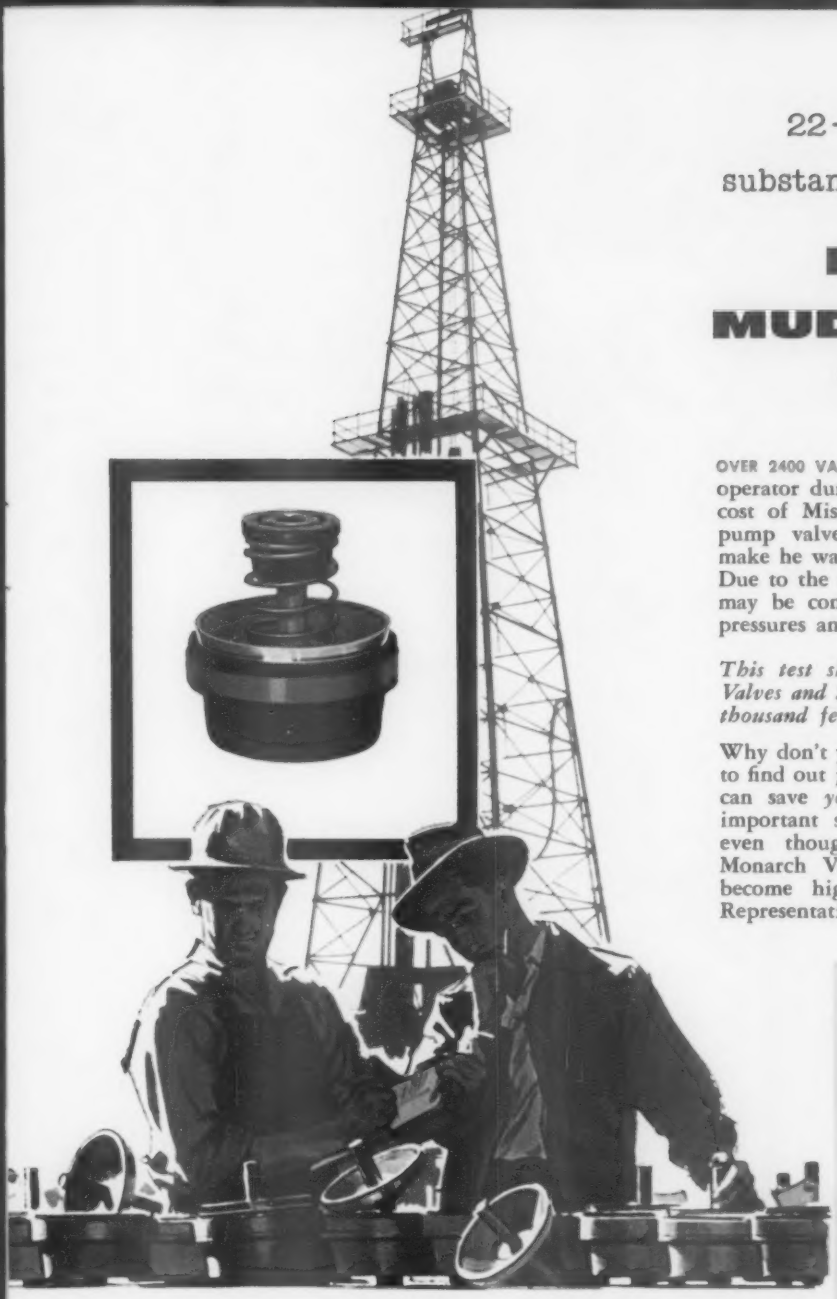


Diaphragm Feeder Permits Safe Handling of Chemicals

A wall-mounted diaphragm feeder handles concentrated chemicals directly from shipping containers. This simple feeder, Model 19130 Proportioneer, saves manpower and gives greater safety. The feeder is furnished as a complete package which can be installed in minutes.

Pumping rates are made adjustable by varying stroke length and stroking frequencies. Pumping rates range from 0.8 to 8.0 gal. per 24-hour period. Reaction time is decreased and accuracy is within plus or minus 5 per cent over a 5-to-1 range. **Write or call Proportioneers, Inc., 345 Harris Avenue, Providence, R. I., for Bull. 1913.**



22-month test showed
substantial savings from using

MISSION MUD MONARCH VALVES

OVER 2400 VALVES AND SEATS were used by a large operator during a 22-month test comparing the cost of Mission Mud Monarch fluid end mud pump valves and seats with the competitive make he was using at the beginning of the test. Due to the size and duration of the test, results may be considered conclusive for the 2500-psi pressures and other conditions encountered.

This test showed that Mission Mud Monarch Valves and Seats cost less than half as much per thousand feet of hole as the competitive make.

Why don't you make a competitive test yourself to find out just *how much* Mud Monarch Valves can save *you?* Many operators have reported important savings at normal pump pressures, even though the advantage of using Mud Monarch Valves becomes greater as pressures become higher. Arrange with your Mission Representative for a competitive test.

COMPETITIVE VALVES

cost more than $36 per thousand feet of hole.

MUD MONARCH VALVES

cost less than $18 per thousand feet of hole!

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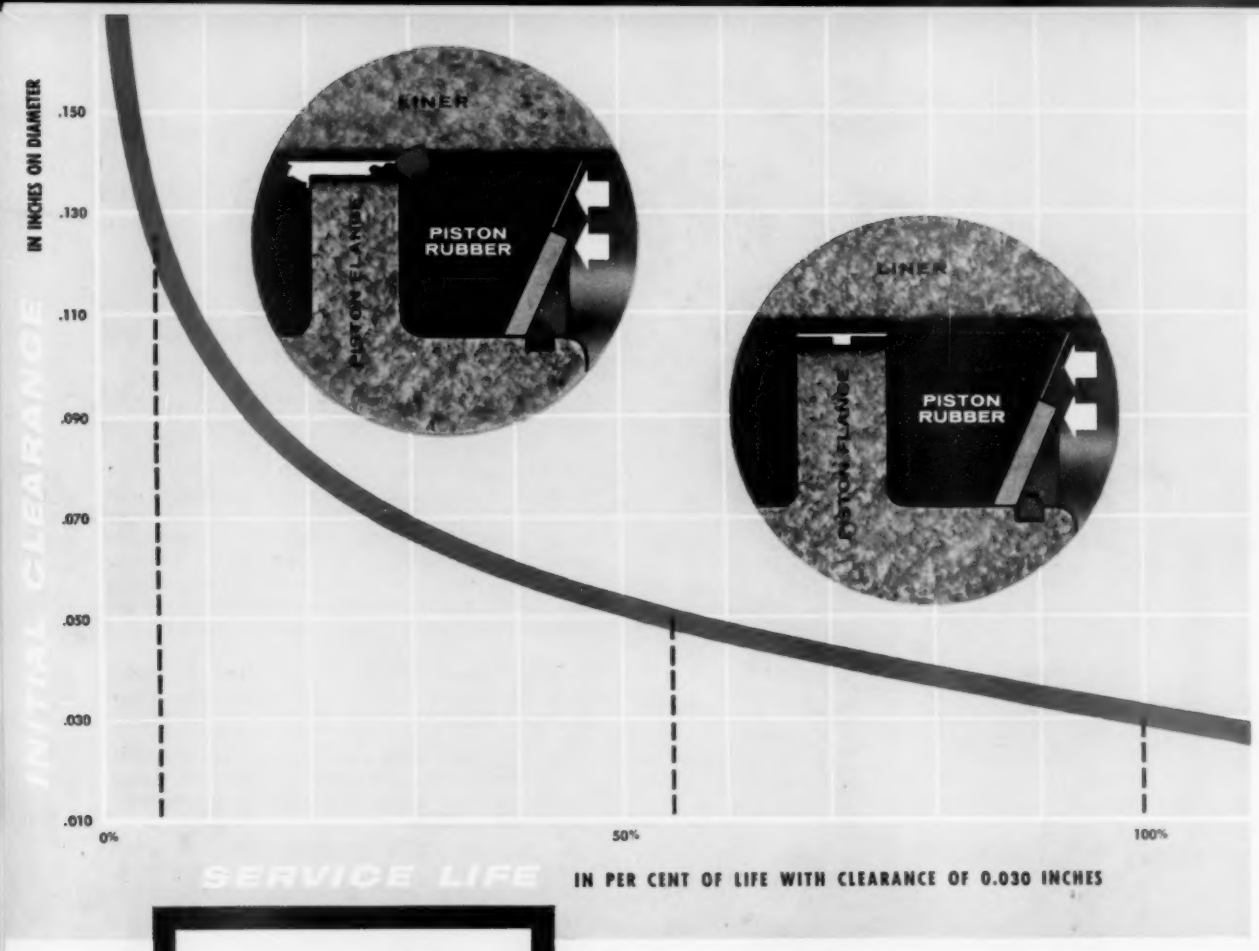

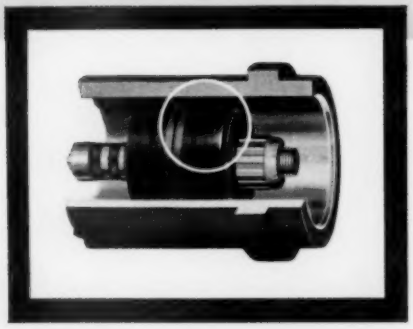

WHY YOU GET LONGER WEAR

.... from piston rubbers when Piston-Liner clearance is kept low!

THIS GRAPH IS AN ACTUAL RECORD of a series of tests run in the Mission Test Pumps. It shows just how much piston rubber life can be increased by replacing both liners and piston bodies before they are excessively worn.

For example, it was proved that piston rubber life could be increased *ten times* when initial clearance was reduced from 0.125 to 0.050. This ratio applies for the test conditions. The general principle applies in many cases—especially when pressures are high and operating conditions severe.

There is one important thing the chart does not show, however. You get closer clearances—*longer*—when you use *both* Mission Pistons and Mission Liners. Precision machining, together with advanced metallurgy and heat treating, accounts for this longer life.

Save both money and down-time by replacing pistons and liners before they are worn too much. When you do, you will make a further saving if you specify *MISSION* Pistons and *MISSION* Liners. They are available through supply stores everywhere.

PESA

Mission Pistons and Mission Liners Help You Maintain Closer Clearances.

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OIL AND GAS JOURNAL

Showcase

- BULLETINS
- CATALOGS
- BROCHURES

Graver Standard Storage Tanks are illustrated and described in this 20-page booklet. The tanks equal or surpass the construction standards of A.P.I. Code 12-C. The booklet includes engineering tables, accessory lists, installation photos, and a list of sales offices and plants. **Write or call: Graver Tank & Mfg. Co., East Chicago, Ind., for the storage-tank booklet.**

•

Rectilinear Recorder Bulletins. Three illustrated bulletins cover a rectilinear-writing galvanometric recorder named the Recti/riter and its accessories. Bulletin R-501 is a six-page, two-color brochure detailing the design and construction features of the Recti/riter which is an ink-writing strip-chart recorder. It satisfies basic trigonometry in changing curvilinear motion to true rectilinear motion. The signal that is inscribed can be measured directly with a ruler. **Write or call: Houston Technical Laboratories, 3609 Buffalo Speedway, Houston 6, Tex., for Bulletin R-501 and supplements.**

•

Detroit Diesel Industrial Power Units and Fan-to-Flywheel Engines are described in the new, two-color booklet 6SA46. It covers horsepower ratings, dimensions, and accessory information on single and multiple-engine models ranging from 56 to 761 rated b.hp. The booklet is illustrated with photographs and two-color cutaway drawings. **Write or call: Detroit Diesel Engine Division, General Motors Corp., Detroit 28, Mich., for engine-booket 6SA46.**

•

The Axelson Hydrax for Pumping Deep and High-Production Wells. A new 12-page illustrated bulletin describes the Hydrax long-stroke hydraulic-pumping unit. This unit has a 26½-in. stroke, a 32,000 peak rod-load capacity, and it pumps at a maximum rate of seven strokes per minute. Specifications, construction, operation, and application data are detailed. **Write of call: Axelson Mfg. Co., 6160 South Boyle Avenue,**

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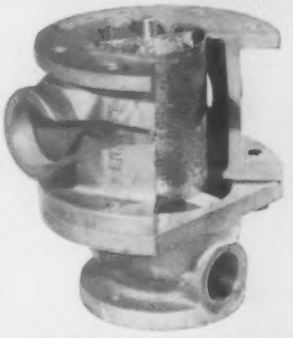
SELF-CLEANING ROTARY STRAINER



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A cylindrical screen within a body with a multi-bladed rotor that rotates by force of fluid flow. Wiper blades on the outer edge of rotor paddles continually wipe the cylindrical screen clean and the debris drops into a catch basin.

When catch basin is full of debris a quick opening valve on the drain line is opened momentarily to clean the basin.

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6 D8 Caterpillar angledozers
20 D7 Caterpillar angledozers
5 51 Buckeye trenchers
2 48 Buckeye trenchers
2 320 Cleveland trenchers
7 K12 Insley cranes and backhoes
2 22B Bucyrus-Erie cranes and backhoes
2 34 Lima cranes and backhoes
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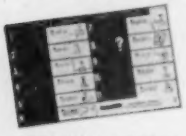
• These, and many other "plus" features, have been designed into these brand-new valves specially developed for power, petro-chemical, and process piping applications. Rated for 2000 PSI at 100° F or 800 PSI at 800° F, they are furnished in sizes from ¼" to 2" with either screwed (**F56**) or welded (**F57**) ends.

Their advanced new design includes quality features like a new "teardrop" 500 BHN heat treated stainless steel wedge which is mated with hard chrome plated stainless steel seat rings to effectively resist seizing, galling or abrasive wear. A Flexitallic spiral-wound gasket, reusable in normal service, assures a positive tight joint. Bulky flanges are eliminated for lower weight and streamlined appearance. Follower, eyebolt, gland nut and operating nut are all stainless steel.

The end result is a lighter, yet sturdier valve which gives better service. Get the complete story. Write today for **Bulletin DH-525.**



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Los Angeles 58, Calif., for the Hydrax long-stroke pumping-unit bulletin.

•

Stop Rust with Rust-Oleum. This new 1957 coatings manual discusses rust and its prevention. It is a 32-page full-color guide for buyers and users of protective coatings. It contains information and recommendations which enable the user to determine the specific coatings needed to protect rustable-metal surface. Over 100 color chips enable the buyer to choose matching colors or to plan color designs for plants and field equipment. **Write or call: Rust-Oleum Corp., 2799 Oakton Street, Evanston, Ill., for Form 256.**

•

Instruments and Apparatus for Laboratory Use. This 30-page publication contains descriptions and photos of new and redesigned instruments and apparatus. Included are: (1) a new line of electric incubators with stainless-steel inner liners; (2) a portable moisture determinator; (3) a vapor-pressure apparatus for use in petroleum analyses; (4) a new centrifuge with stainless-steel bowl; (5) microscopes; and (6) electric timers. The booklet also contains an article on paper chromatography. **Write or call: Central Scientific Co., 1700 Irving Park Road, Chicago, Ill., for Cenco News Chats No. 83.**

•

Gardner-Denver Air-Cooled Compressors. A new 16-page bulletin shows a a line of small, air-cooled compressors. Both one and two-stage compressors are covered. Working pressures range from 85 to 175 psi. Specifications for each model are given. They are offered with a wide selection of controls for automatic starting and stopping, and for constant-speed installations. Weatherpoof, explosion-resistant, and gas-tight controls are available. **Write or call Gardner-Denver Co., Quincy, Ill., for Bulletin AC-15.**

•

Cost Record Book. This book provides a comprehensive yet simple system of analyzing truck-operating costs. It can be tailored to any truck-using business and to any size fleet. **Write or call The White Motor Co., Cleveland 1, Ohio, for the Cost Record Book.**

•

Ampco Centrifugal Pumps is the title of revised Bulletin P-3b. This six-page bulletin describes new high-speed centrifugal pumps for handling clear liquids and fine slurries. These pumps are available in Type 316 stainless

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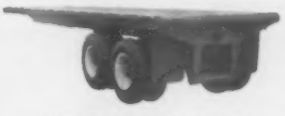
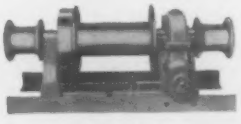
Leland "Packaged Unit"

Leland Pole Trailers

Leland Single Axle Float



Leland Tandem Self-loading Float



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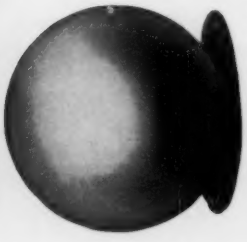
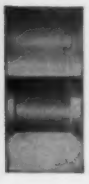
For ordinary pumping where little trouble is encountered.



"Single Seal" Seat
A competitively priced stainless steel seat for routine pumping.



"Double Seal" Seat
For harder than usual pumping — double contact with the ball.

"O-Ring Seat"
A 2-piece stainless steel seat specially recommended where ordinary or fracturing sand is causing seat failures.

"Sheralloy" Seat
A cast alloy definitely proved resistant to corrosion. Also good for hard pumping.

For best service use the right Baird ball with the right Baird seat.

steel, Ampco metal and Illium G to combat corrosion, erosion, cavitation-pitting and wear. Hydraulic range includes capacities of 600 g.p.m. and heads to 160 ft. The bulletin presents engineering drawings, photographs, tables, and graphs. **Write or call Ampco Metal, Inc., 1745 South Thirty-Eighth Street, Milwaukee 46, Wis., for Bulletin P-3b and insert.**

●

Pathfinder Centralizer Catalog. An eight-page catalog covers a line of oil-well tools which includes hinged, rotatable, and close-tolerance centralizers. It covers the well-bore wiper, a tool which removes undesirable materials from the walls of wells to permit a better bonding of cement to the formation. It is available in three models—a no-weld, standard, and circular type. The catalog details engineering facts and includes price lists. **Write or call Oil Country Equipment Co., Inc., Box 12281, Houston, Tex., for the centralizer catalog.**

●

Refco Bulk Handling Equipment and Fabricating Specialists. A new 12-page catalog covers a line of bulk-handling equipment and correlated equipment. Standard bulk cement, mud, and sand-frac plants, both stationary and portable, are discussed and illustrated. Bulk-commodity trailers and bulk-truck units are also covered along with dry-mud and cement-storage bins and feeders. **Write or call Rig Engineers & Fabricators Co., Inc., 6330 Washington Avenue, Houston, Tex., for Catalog 1956-57.**

●

The Olivite Acid Handling Pump. A new two-color, six-page bulletin describes the design features, corrosion-resistant materials of construction, applications, sizes, and capacities of this acid-handling pump. It contains equipment photographs, cross-sectional wash drawings and performance and power-requirements graphs. **Write or call Dorr-Oliver, Inc., Stamford, Conn., for bulletin No. 5004.**

●

Diesel-Tractor and Pull-Scraper Brochures. Folders HD-11G and HD-6G offer information on two models of diesel-powered crawler-tractor shovels and the matched attachments to go with each model. Line drawings and pictures show them in action. Four pull scrapers are featured in the third piece of literature (MS-1149). Each scraper model is pictured in action. **Write or call Allis-Chalmers Mfg. Co., Construction Machinery Div., Milwaukee, Wis., for folders HD-11G, HD-6G, and MS-1149.**

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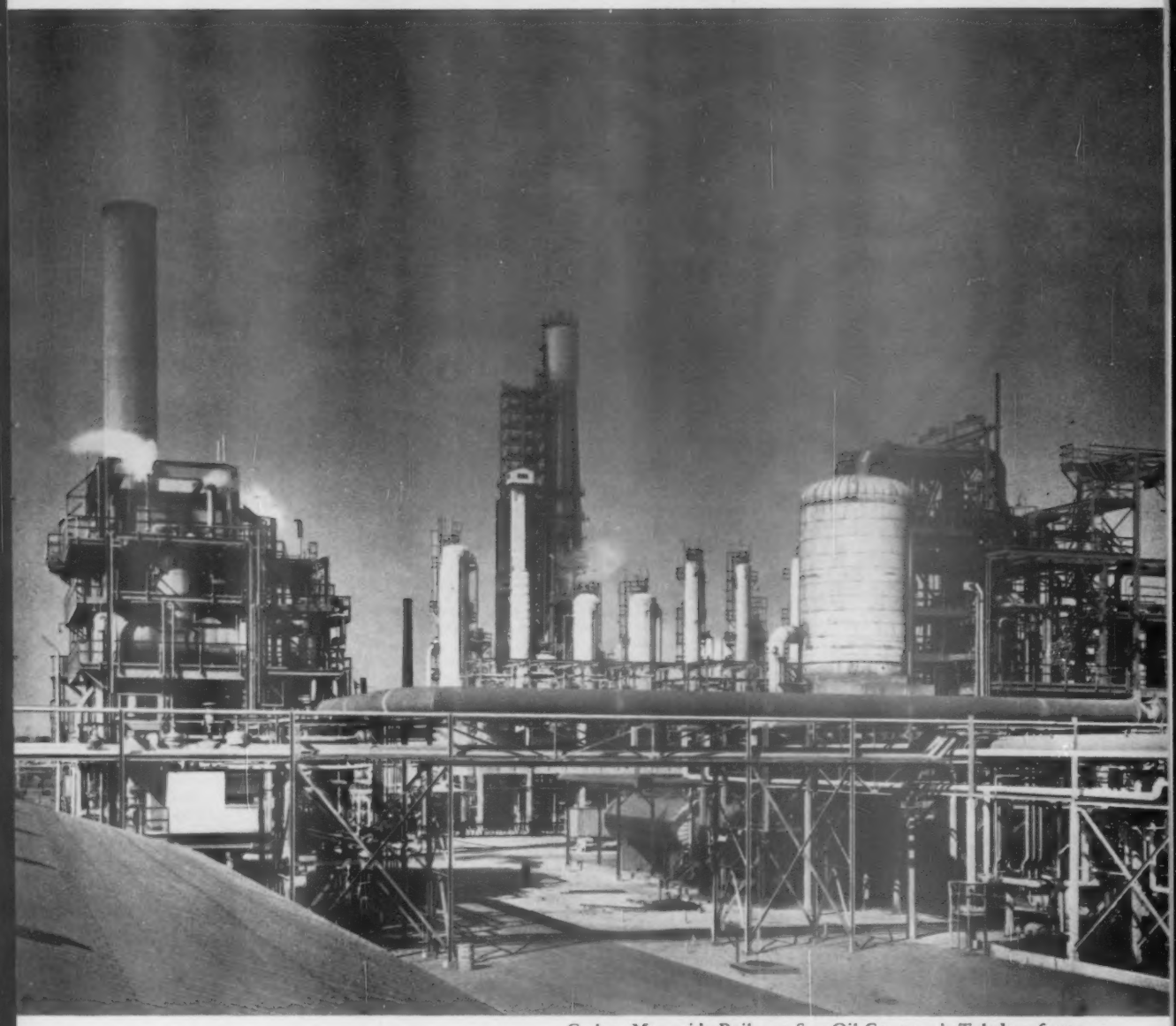

Carbon Monoxide Boiler at Sun Oil Company's Toledo refinery.

3 B&W Carbon Monoxide Boilers Save Fuel For Sun Oil

Sun Oil Company has three B&W Carbon Monoxide Boilers in its refineries at Toledo, Ohio, and Marcus Hook, Pa. All are used with Houdriflow cracking units. The first boiler went on stream at Toledo three years ago. The second, at Toledo, and its twin at Marcus Hook, are of the oxycatalyst type.

The three B&W "CO" Boilers are effecting substantial fuel economies at both refineries.

Cracking units at Sun Oil, like others using B&W "CO" Boilers, are completely independent of outside steam and energy sources at all times. Whether or not the cracking unit is operating, steam is always available.

Extended, sustained service has proved the reliability, efficiency, and economy of B&W "CO" Boilers in refineries throughout the nation. They are flexible in design and arrangement to meet varying refinery conditions. B&W engineers can show you how a "CO" Boiler can serve your refinery, regardless of size, steam pressure and temperature requirements. The Babcock & Wilcox Company, Boiler Division, Dept. OGJ-2, 161 East 42nd Street, New York 17, N. Y.

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EQUIPMENT MEN . . . in the News

Godfrey Appointed As Manager for A-C

Appointment of H. R. Godfrey, Jr. as manager of product sales, Allis-Chalmers West Allis centrifugal-pump department, has been announced by H. P. Binder, department manager. Godfrey joined A-C in 1948 as an engineer. After serving as an assistant engineer in the centrifugal pump department he was assigned to the New York district office. In 1956 he became assistant to the general manager of Allis-Chalmers general products division.

Martin of Martin-Decker Joins Ramsey, Brown & Co.

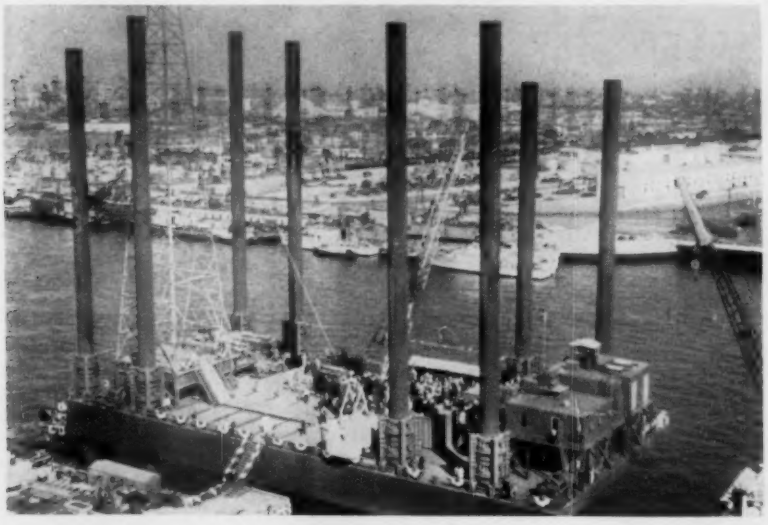
R. Nicholas Martin has joined the staff of Ramsey, Brown & Co., Los Angeles advertising agency. Martin had been advertising manager of Martin-Decker Corp., Long Beach, Calif., for 3 years. He will service Plicoflex, BJ Service, Pipeline Coating & Engineering Co., Commercial Iron Works, McGaffey-Taylor, Hydril Co., Hopper Machine Works, and other oil-tool accounts.

A big part of his 3-months training period for Martin-Decker was to assist service men to install and repair drilling-control instruments. This means he will be one of the few oil-tool account executives who have actually been christened with black magic on the rig floor.

Los Angeles Nomads Elect Officers

The newly elected and outgoing officers of the Los Angeles chapter of Nomads are shown at the annual business meeting. Left to right: (standing) John S. Page, of Page Oil Tools, assistant treasurer 1956; Andy Anderson, of Pacific Perforating Co., assistant secretary 1957; W. B. Reinhold, of Abegg & Reinhold Co., assistant treasurer 1957; H. Rex Collins, Jr., of Hydril Co., treasurer 1956; John McEwen, of A. D. Rushing, Inc., assistant secretary 1956; Joe Shlarb, of Continental-Emsco Co., regent 1956 and 1957; John Flanagan, of Johnston Testers, senor regent 1956; J. Murray Walker, of Lane-Wells Co., deputy sergeant-at-arms 1956.

Left to right: (seated) Tom R. Ashe, of Globe Oil Tools Co., deputy sergeant-at-arms 1957; Earl M. Daniels, of Hydril Co., sergeant-at-arms 1957; Ben A. Hilliard, of Web Wilson Oil Tools, treasurer 1957; Bob Gaylord, of Wagner-Moorehouse, president 1957 and secretary 1956; Bill Brooks, of Byron Jackson Tools, Inc., vice president 1957 and sergeant-at-arms 1956; Tom G. Martin, of R. J. Eiche & Associates, secretary 1957 and vice president 1956; and Harry E. Hester, of McCullough Tool Co., regent 1957 and president 1956.



Offshore Platform Begins Operations

Pacific Driller No. 1 is a mobile platform designed and fabricated by Offshore Constructors, Inc. It is shown during its dedication at Terminal Island, Calif. The all-steel hull is 200 ft. long by 100 ft. wide and 13 ft. deep. Each of the eight caissons is 195 ft. long and 6 ft. in diameter. They are made of 1-in. steel and each is equipped with two air jacks. The drilling equipment, shown at left, includes a National Type 110 rig with a three-section type BT-28-1½ drive group, a Type C-350 slush pump, and Type SHS-20½ rotary.

Oil Well Supply Makes Personnel Appointments

Appointments of Samuel E. Clark, Jr., as manager, and Raymond T. Cheney as field representative at Corpus Christi, and Ellis P. Festervan as field representative at Houston has been announced by M. F. Jones, Gulf Coast area manager of Oil Well Supply Division.

At the same time Benjamin F. McIntosh, Jr., was appointed field representative at Sherman, Tex., and Joseph M. Rogers, field representative, was transferred from Sherman to San Angelo, Tex. The changes were announced by William Miskimins, central midwest area manager.

Howard R. Dierking has been appointed store manager of the Arkansas City, Kans., store it was announced by Mark Barkhurst, Mid-Continent area manager.

Clark joined Oil Well Supply in 1950 at Victoria, Tex. Cheney was employed in 1949 at Alice, Tex. Prior to Cheney's employment he had 20 years' oil-field supply experience. Festervan joined the company in 1955 at Houston. McIntosh was employed in 1952 at Graham, Tex., and transferred to Sherman in 1955. Rogers managed stores at Denver City and McCamey, Tex., prior to his present transfer.

CLEVELANDS trenching and backfilling on the TRANS-CANADA PIPELINE

● This Cleveland is one of several 320's excavating trench for 34-inch pipe on the 574-mile Alberta-Winnipeg leg of the 2,250 mile Trans-Canada pipeline. Trench for the big line goes as deep as 76 inches, 52 inches wide at bottom. Average production for each Cleveland is better than a mile a day.

Photos courtesy Trans-Canada Pipe Lines, Ltd.

Cleveland 190 backfiller is fast worker, stays right on heels of lowering-in gang in boggy area of western Saskatchewan. One-man-operated, the 190 has all speeds in either direction, maneuvers fast and saves dozer time on crossings. Perfectly balanced on long, sealed-bearing crawlers, it easily negotiates wettest swamps and toughest hills.

Width across trench top varies according to soil conditions. This Cleveland 320, equipped with slopers, is cutting as much as 8 feet wide at the top to 4 feet wide at the bottom. In Saskatchewan's "Little Sahara" region, sloping to these widths was normal.

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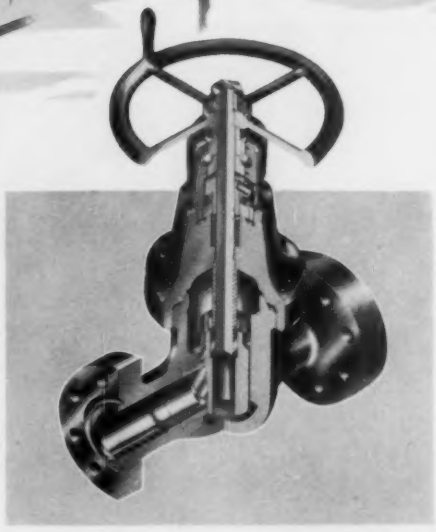
From a maintenance point of view . . .



BIW non-lubricated gate valves

Whether your locations are this remote or not, you can reduce maintenance costs and increase your operating efficiency with BIW Valves. Because once they are in, you can forget them. You waste no man-hours lubricating them. The tight metal-to-metal seal and the simplified design of the valve have been proved in years of trouble-free service.

The BIW gate valve is truly easy to open or close under pressure. For instance, the 10,000 lb. test, 2½ in. valve requires only 25 foot-pounds of torque against a pressure of 5,000 psi. Plus, when you close it, you know that it will hold. More than 35,000 BIW Valves in the field are holding now, and will be working smoothly, effectively and with no fuss years from now.

ALCO specialists are available to consult with you. Write or call Petroleum Industry Equipment Division, Department BV-2, Bank of the Southwest Building, Houston 2, Texas.

ALCO

ALCO PRODUCTS, INC.

NEW YORK

Sales Offices in Principal Cities

Dierking was employed in 1953 at McPherson, Kans.

Stanolind's Elias Elected As Bank Advisor

The election of Whitney M. Elias, vice president and manager of Stanolind Oil & Gas Co.'s Texas-Louisiana Gulf Coast division, to the advisory committee of the board of directors, Bank of the Southwest, has been announced by A. G. McNeese, Jr., president of the bank.

Elias was named to his present position with Stanolind in 1956. Prior to that he had served in supervisory capacities at Tulsa since 1943.

Camco Announces Transfers And Appointments

Camco, Inc., announced the following: Paul R. Mills has been made president and chairman of the board; E. K. Watters becomes vice chairman of the board; H. E. McGowen, Jr. is executive vice president and general manager; and W. M. Edwards becomes secretary and treasurer. Pat Childs is now general sales manager under Sam Pearce, vice president of sales. H. H. Moore has been named chief engineer, and Charles Nevels has been moved from Lafayette into Houston as Gulf Coast division manager, with district managers Walter Groth, Houston; J. D. Collins, Houma, La.; Robert Linscomb, Lafayette, La.; Travis Maxwell, Corpus Christi, Tex., and M. G. McFall, Shreveport, La.

Tulsa Oil Executives Hold Annual Party

The Coffee Club, a group of Tulsa oil men who meet every morning in the Mayo Hotel to swap information and, secondarily, to drink coffee, held its annual party recently at the Mayo. More than 70 prominent oil men attended the affair. Pictured above (left) is Burch Mayo, vice president of the Mayo Hotel and host at the party, greeting Barney Feagin, Sr., president of the club for the 1956-57 season. Feagin is a well-known Tulsa independent operator.

Homco Announces Personnel Changes

Houston Oil Field Material Co., Inc., has announced 14 personnel changes as follows: Drew J. Almond, from Edmonton, Alta., to Oklahoma City; R. J. Bradshaw, from Odessa to Liberty, Tex.; R. M. Dupree, from Sherman to Freer, Tex.; Robert C. Evans, from Harvey to Lake Charles, La.; E. S. Gilbert, Jr., from New Iberia to Morgan City; Boyd C. Hebert, from Lake Charles to Harvey, La.; J. E. Martin, from Corpus Christi to Houston, Tex.; Joe W. Moore, from Andrews to Odessa, Tex.; J. C. Pruett, from Farmington, N. M. to Houston; Doyle Rogers, from Kenedy to Pearsall, Tex.; C. D. Steverson, from Oklahoma City to Brookhaven, Miss.; Raymond Unger, from New Iberia, La., to Odessa, Tex.; W. A. Westbrook from Pearsall to Kenedy, Tex.; and John H. York, to store manager, Kenedy, Tex.

Western Co. Announces Promotions and Transfers

Harold Parsons has been promoted to regional manager of the North Texas-Oklahoma region. He came from Western Co.'s district office in Odessa, Tex.

Other changes in Odessa include

* Virtually chemically and galvanically inert
* Predictable low consumption rate
* Electrically stable with good conductivity
* Dense homogeneous structure — no moisture absorption
* No practical current density limitations
Everything points to
DURIRON®
Impressed Current
ANODES for cathodic protection
DURCO
THE DURIRON COMPANY, Inc. / Dayton, Ohio

Lloyd Helms to district manager, T. J. Bicknell as station supervisor, and B. P. O'Hare promoted from service engineer to field supervisor.

Rankin, Tex., district office changes are: Earl Pfaff, former station supervisor, is now manager; Grady Holder, former treating engineer in Seagraves, Tex., and Cushing, Healdton, and Lindsay, Okla., to station supervisor; Wallace Arnold is now field supervisor in Snyder, Tex.; William H. Seabolt has been transferred from Rankin to Midland as senior sales engineer; and J. T. Weaver is the new area sales supervisor in the Rankin district.

Weatherford Oil Adds Four Sales Engineers and a Pilot

New sales and service engineers in the Houston area are Bernie W. Lawson and Henry J. (Bud) James. Martin W. Smith will pilot for Weatherford Oil Tool Co. out of Houston.

Bill G. Brewer is a new sales and service engineer in the western division stationed at Odessa, Tex., and Marion C. Hutton has the southern division sales territory with headquarters in Alice, Tex.

Lawson formerly was with Permian Mud Service in Odessa, and prior to that was with Stanolind Oil & Gas Co. James came to Weatherford from Corpus Christi where he was with Roberts Directional Drilling Co. Brewer formerly was with Associated Oil Field Rentals in Odessa. Hutton formerly was with McEvoy Co. and Baker Oil Tools Co. Smith was a charter pilot for Casper Flying Service in Casper, Wyo.

Chain Belt Announces New Offices and Managers

J. B. ROBERTS

J. B. Roberts becomes eastern regional sales manager, William Sivyer becomes midwest and southern regional sales manager, and H. F. Bergis has been appointed northwestern regional sales manager for Chain Belt Co. A. B. Abelt, vice president of sales, made the announcement.

At the same time the following men were appointed to district sales managerships: J. S. Moore at New York City, H. F. Weil at Philadelphia, Dabney P. Murrill at Atlanta, Ga., Wilbur F. Church at Portland, Ore., Raymond F. Traylor at the new district sales office at Charlotte, N. C., and C. D. Bergen at the new district sales office at Newark, N. J.

WILLIAM SIVYER

H. F. BERGIS

Robertshaw-Fulton Buys Beta Corp.

Robertshaw-Fulton Controls Co. has announced the acquisition of The Beta Corp., Richmond, Va., manufacturers of specialized vibration monitoring equipment.

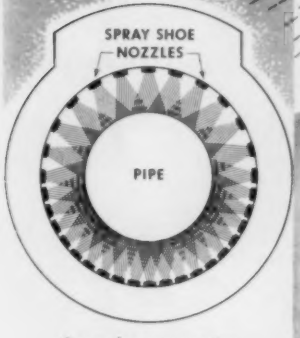
Beta Corp.'s operation will be moved to Philadelphia and consolidated with the Field Instrument Division, a unit of Robertshaw-Fulton.

Franklin to Continue Helicopter Service

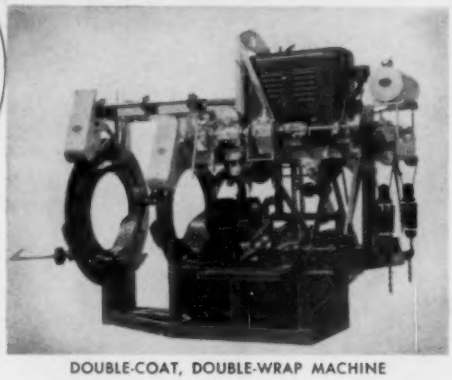
Franklin's helicopter service featured during the A. P. I. meeting will be in permanent operation for friends and customers visiting Chicago, according

A SPRAY SHOE Should SPRAY!

Perrault Coating & Wrapping Machines Have Exclusive NOZZLE-FITTED SPRAY SHOE



Spray shoe cross section shows how spray nozzles give DOUBLE dope coverage on pipe top, TRIPLE coverage on pipe bottom . . . Insurance for a better coating job.



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PERRAULT COATING AND WRAPPING MACHINES for large pipe sizes are more dependable. They have less downtime because, when compared to the industry, they are designed with: More power, heavier transmissions, bigger clutches, stronger speed reducers, greater pumping capacity, full-width rubber crawlers. Even with these better components Perrault units are lighter in weight. Other models available for all pipe sizes; any coat and wrap combination. Call Perrault for complete details.

ALSO CARRIED IN STOCK: Pneumatic Inside Line-up Clamps — sizes 20 to 36 in. Cleaning and Priming Machines — line traveling or stationary. Glass Pipe Wrap, Asbestos Felt Wrap, Kraft Wrap, and Rock Shield. Tar-Heating Kettles, Burners, Patch Pots and Accessories. Pneumatic-Tired Lowering-In Cradles, Adjustable Pipe Cradles, Five-roller Cradles, Tongs, Hooks, Blocks, Belts, Slings, Line-up Clamps, Hand Tools, Supplies and Equipment of every sort.

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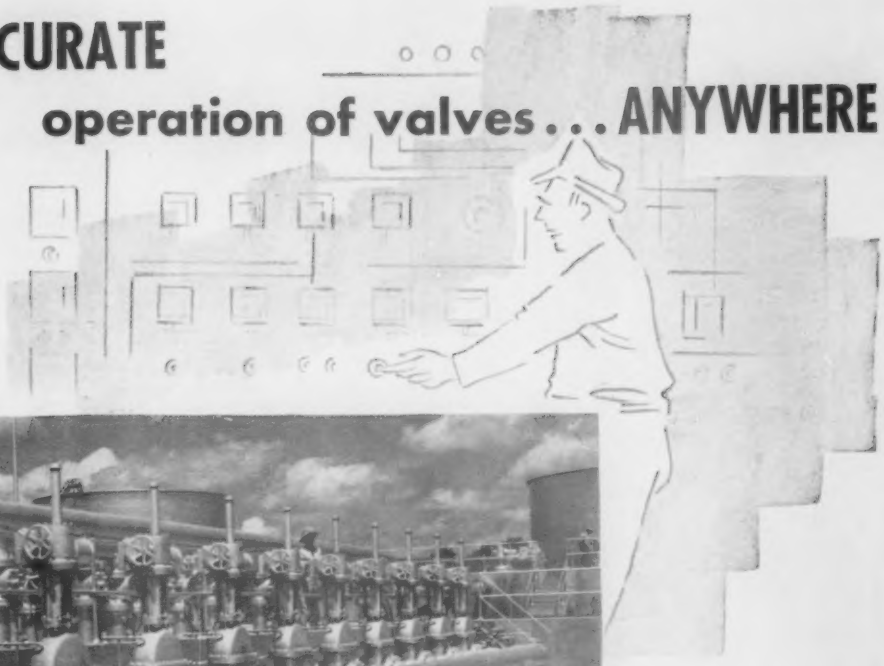
RAPID, ACCURATE operation of valves... ANYWHERE



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to Jene Harper, president of Franklin Supply Co. Service is offered from Chicago's two airports to the Hilton heliport. Travel time from O'Hare airport to downtown is cut to about 12 minutes.

Eastman International's Ed Fain Is Promoted

Ed Fain has been named vice president and general manager of Eastman International Co., whose main offices are in Denver. After being graduated from college, he took a job with Geophysical Service, Inc. During the 10 years he worked for this corporation, Fain held several positions, including instrument designing and building. He worked for G. S. I. in the United States, Mexico, Venezuela, and India.

After government and wartime duty he joined Geotechnical Corp. of Dallas as a geophysicist and sales engineer. While working with this corporation he worked in Libya, Pakistan, Switzerland, and Italy. In 1956, Fain joined Remington Rand Co. in Denver and worked on electronic computation of petroleum problems.

Stuart Steel Protection Appoints Reddin to Sales

Rubin C. Reddin has been appointed regional representative with Stuart Steel Protection Corp. He will service pipeline utilities in Ohio and adjoining states with pipe coating, pipe insulation, rectifiers, and Dow magnesium anodes. Reddin has been associated with Elder-McNulty X-ray Co., and Protecto Wrap Co.

Gulf Oiltool Forms to Offer Oil-Well Tools

Gulf Oiltool Co. was formed January 1, 1957, in Houston, Tex. It is owned D. M. Best. The company has acquired full patent ownership and manufacturing and sales rights to the Gulf tubing-tool joint which has been sold since 1947. It plans to develop and market other types of oil-well tools. The export agent for Gulf Oiltool is R. S. Stokvis & Sons, Inc., with offices in New York.

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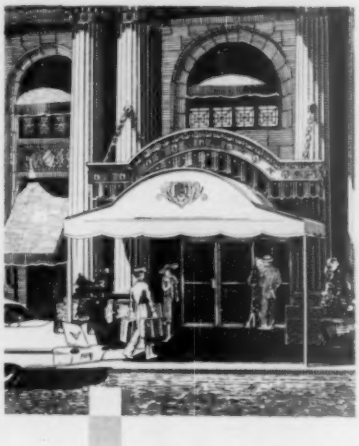

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Esco Appoints Van Vranken As New Sales Manager

VAN VRANKEN

Appointment of Leonard J. Van Vranken as sales manager was announced by G. W. Levering, Jr., president of Engineering Supply Co. Esco distributes industrial, electronic, geophysical, power transmission, and safety supplies throughout the Southwest representing some 500 manufacturers. Engineering Supply Co. is a subsidiary of Texas Instruments, Inc., an electronics and geophysics firm.

Lane-Wells Transfers Dillehay, Advances Gregory

D. R. Dillehay has been transferred with the same title as office and credit manager to the Gulf Coast division headquarters in Houston. James F. Gregory has been promoted to take Dillehay's place as Mid-Continent division office and credit manager. Dillehay has been with Lane-Wells for 20 years.

Gravitt to Sell Win-Well's New Multiport Valve

J. O. GRAVITT

James O. Gravitt, manufacturer's agent at Mount Vernon, Ill., has been appointed sales representative of Win-Well Mfg. Co. of Los Angeles. Win-Well makes a new seven-way multiport selector valve. Gravitt has worked for several pipeline contractors in the midwestern area and an oil-field equipment manufacturer in Tulsa.

Jimmie A. Sledge of Mount Vernon and Homer R. Moore, Fairfield, Ill., will assist Gravitt in covering Illinois, Indiana, Kentucky, Ohio, and Michigan for Win-Well.

Crane Packing Co. Promotes Four Executives

Carl E. Schmitz has been promoted to executive vice president from vice president-sales, Vance E. Vorhees has been promoted to vice president-sales from assistant general sales manager, B. H. Stenberg has been promoted to vice president-manufacturing from works manager, and E. H. Stubenrauch has been appointed to assistant general sales manager from divisional sales manager for Crane Packing Co., Morton Grove, Ill. President Karl V. Rohlin made the announcement and stated that the increase in business called for more and broader executive authority.

J & L Transfers Baker

James A. Baker has been transferred to Hill City, Kans., as store manager. He had been store manager in Tulsa. A. G. Bastian, manager of field sales of Jones & Laughlin Supply Division, made the announcement. Baker started with J & L at Overton, Tex., in 1947.

C. & I. Will Build Nitric Acid Plant in England

Fisons, Ltd., manufacturers of fertilizer and chemicals, announced the award of a contract to Chemical & Industrial International, Ltd., of Nassau, Bahamas for the construction of a 250-ton per day nitric-acid plant to be built for Fisons on the Thames estuary at Stanford-le-Hope. The plant was designed by Chemical & Industrial Corp. of Cincinnati, Ohio, and will be constructed by C. & I. International who have the right to license C. & I. process outside the United States and Canada.

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LION E-120 COATING

YOUR PIPE COATING CREW will not be exposed to the discomfort and danger of toxic fumes or creosote burns — with our LION E-120 asphalt coating. For LION E-120 is all asphalt — non-toxic — can be handled with complete safety to workers.

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Lion Coatings • Holcombe Selenium Rectifiers
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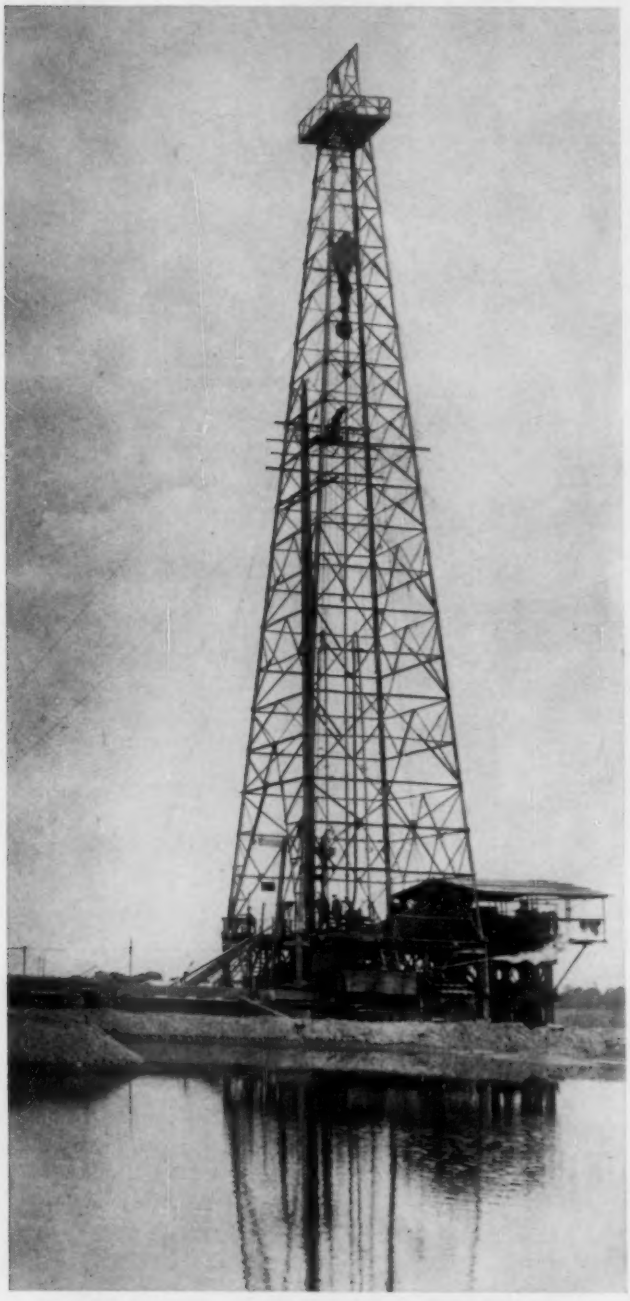
Successful cementing below 14,000 ft.–at 316°F. with **UNAFLO*** Oil-Well Cement



CEMENTING DATA

. . . Rayne, Louisiana, oil field: A. R. Blanchard #1 and Dumas Cormier #1. Both wells drilled by the Nicklos Drilling Co., for the Continental Oil Company.

At A. R. Blanchard #1 – 9⅝" casing set at 10,903' and cemented with 900 sacks of 4% gel Unaflo (bulk). Mud weight and temperature normal for depth.

When 5½" OD 23-lb. casing was set in 8⅝" hole at 14,020' with 800 sacks of neat Unaflo (bulk), static temperature of the well was 316° F. (Under the average temperature gradient of Gulf Coast wells 316° F. corresponds to a well depth of 15,750'.) Mud weight per gal was 16.3 lbs., and bottom hole pressure 10,955 psi.

At Dumas Cormier #1 – 9⅝" casing set at 10,516' and cemented with 900 sacks of 4% gel Unaflo (bulk). 5½" OD casing set in 8⅝" hole at 14,025' and cemented with 800 sacks of neat Unaflo. Conditions were identical with those of the Blanchard well.

Primary casing jobs were successful, and no squeeze jobs were necessary before production. This indicates that a good seal and bond with the formation were obtained.

- On deep jobs like these oilmen have learned to rely on UNAFLO retarded oil-well cement to go into place without a hitch.
- Slurries pump easily, stay fluid and pumpable under severe conditions of temperature and pressure.
- UNAFLO's retarded set gives vital extra time in emergencies, yet slurries form a strong, watertight, sulphate-resistant seal.

For typical data tables, write: Universal Atlas, 100 Park Avenue, New York 17, N. Y.

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*"UNAFLO" is the registered trademark of the retarded oil-well cement manufactured by Universal Atlas Cement Company

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EXPLORATION

Athabasca Heralds a New Era

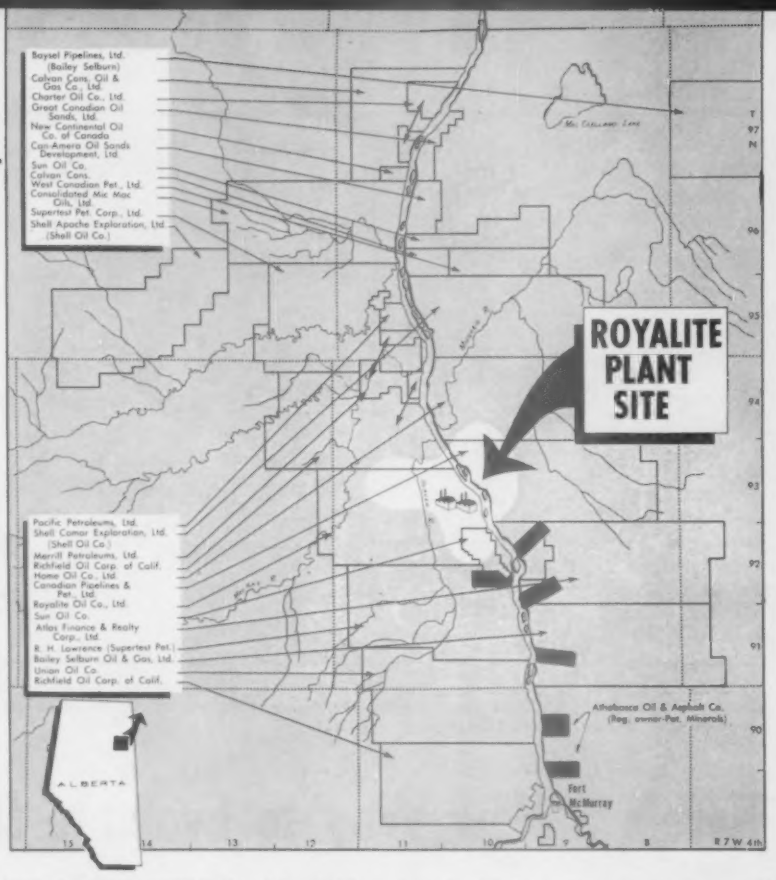
by Frank J. Gardner

A COUPLE of weeks ago, a new era began for the oil industry. It was launched with an announcement by Royalite Oil Co., Ltd. That aggressive company will begin, this spring, the first commercial oil operations in the heart of Alberta's famous Athabasca tar sands. This will be the first big operation in bituminous sands anywhere in the world. And its progress will be closely watched, for it could set a pattern of oil production for generations to come.

Royalite will soon start building shops, offices, warehouses, garages, and housing; in 1958, processing and separator equipment will be installed; in 1959, a 350-mile pipeline will be laid to Edmonton; and in 1960, the first competitive crude oil from Athabasca will flow southward.

This summer, bulldozers and hydraulic guns will begin stripping away the 50-ft. overburden that covers the tar sands. When processing construction is finished, the raw sands will be trucked to the separation plant, where 50 giant centrifuges will remove the sand, clay, and water from the oil. Then the 7°-gravity oil will undergo coking processes and desulfurization, and flow into the pipeline as 29°-30° oil. Royalite anticipates an initial capacity of 20,000 bbl. per day in return for its investment of $50,000,000, and it conservatively estimates the reserves on its 50,000-acre lease at a billion barrels. Other leaseholders and permit holders along the Athabasca are shown on the map; these cover only a part of the tar-sands area believed to spread over as much as 30,000 sq. miles.

Damp brown sugar . . . What is this Athabasca? It's a vast deposit of sand-in-oil, resembling nothing so much as a layer of damp brown sugar; that's the term used by Ted Link in a geologic paper written in 1951. It's been known to exist since 1788, when an explorer named Peter Pond recorded it; in 1789, Alexander Mackenzie took a look at it on his Arctic expedition. And since 1897, there've been numerous attempts to produce the oil at a price to compete with natural crude oil. Several extraction methods have succeeded, but not at a competitive price. It was a matter of economics, not technical mehods, to get Athabasca oil on the market. Now Royalite, using the Coulson centrifuge method, believes it has the problem licked.



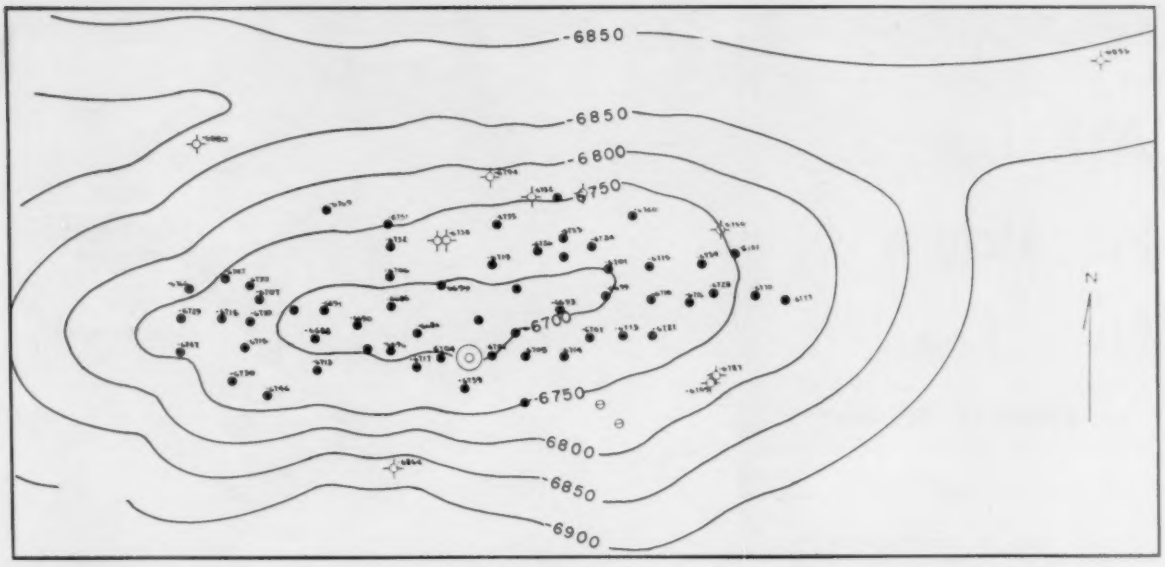
EXPLORATION PERMITS and leaseholdings along the Athabasca River cover only a small portion of the potentially productive tar sands of Alberta. First commercial production from the sands is now anticipated for 1960.

In a washing machine . . . Coulson's centrifuge was simplicity itself. He got the idea while sitting in his basement one day, watching the washing machine spin. He knew the problem was to remove the sand from the oil, not vice versa as in ordinary oil production. Why shouldn't centrifugal force do the job? So he filled a bottle with oil sand, poured in some water and kerosine, and gave it a ride in the washing machine. The result was a pleasant surprise—three clean levels, one of oil, one of sand, and one of water. He succeeded in selling his idea to sources of capital and continued his experiments with ever-greater success; then, in 1955, he interested Royalite and a deal was made.

Athabasca is the largest oil reserve in the world. Reserves are variously estimated, on meager information, at 100, 300, on up to 500 billion barrels. But these are gross, not recoverable reserves. A lot of the oil sand lies beneath 500 to 1,800 ft. of overburden. Hartley and Brinegar (Union Oil Co. of California) in a recent paper, pointed to an **economic** reserve of 5 billion barrels by known mining methods. Surface mining will lend itself to only a minor part of the deposit; but successful application of an underground recovery method might throw open most of the buried sands to exploitation.

What will be the effect of Royalite's project on world oil markets? Nothing spectacular, for sure. After all, 20,000 bbl. a day is barely a trickle today. The free world is going to need Athabasca's oil, and the sooner it's commercialized, the better. In the process, we'll learn a lot more about this peculiar giant oil bog.

Launches a new era . . . A new era has begun. The tar sands, once referred to by an eminent Canadian geologist as ". . . one of the most fruitful fields for mental gymnastics known to geologists," may well be our most fruitful field, period.



NEW HOPE FIELD, Franklin County, Texas. Contoured on top of Massive anhydrite. Interval, 50 ft. Deep contouring is shown here before the Smackover discovery, double circle, 1D Ramey Unit, was made. Structure rates 32 points, stratigraphy, 4 points and proximity to production, 1 point. Total 37 per cent. Fig. 1.

Here's a New Way to Evaluate Drillable Prospects

by D. Allen Mabra, Jr.

IN the light of today's aggressive drilling programs and the rapid penetration of many formations, a simple method is needed to evaluate competitor's oil and/or gas tests as to their productive possibilities before drilling. The following, therefore, is not an attempt to establish a new means for locating petroleum reserves. It is instead a device by which we may reduce to simple mathematical terms the often complicated factors of subsurface contouring, geophysics, and general geological knowledge of any given area. More specifically, any given bore hole. It is well to note, at this point, that the accuracy of this evaluation depends only in part upon geological techniques. The remainder is simple mathematical calculation.

The method is designed primarily to evaluate exploration tests and to give the geologist a simple means of relating these tests. Field-development wells may be evaluated also, but most of the high values could be estimated by inspection. A discovery well, which had a low-point value because of lack of control, will create the greatest amount of excitement and speculation in the industry. This type of test has the better possibility for initiating a major find.

A given test is analyzed in three categories: Structure, stratigraphy, and proximity to production. Points are given in each category according to the schedule below.

STRUCTURE

	No. points
Maximum	42
Excellent (definitely proved as positive or otherwise favorable anomaly)	32
Good (definite flattening or sudden relaxing or regional dip)	15
Fair (poor control but exhibits possible favorable structure)	5

Points may be added to or subtracted from the above for such additional information as seismic coverage, surface gelogy, etc., or if the proposed test is to be an inside location. Maximum (+ or — 10).

STRATIGRAPHY

Number of possible pay zones:	No. points
Maximum	9
4+	4
2-3	3
1	1
0	*

A maximum of five points may be added to the right-hand column when subsurface control indicates a favorable stratigraphic trap—0-5.

*Field wells only. Should subsurface control suggest that a possible pay zone may be absent or below field water level, this zone may not be added to the left-hand column. If the resultant figure for this column is zero, the final figure for the entire evaluation must be divided by 10.

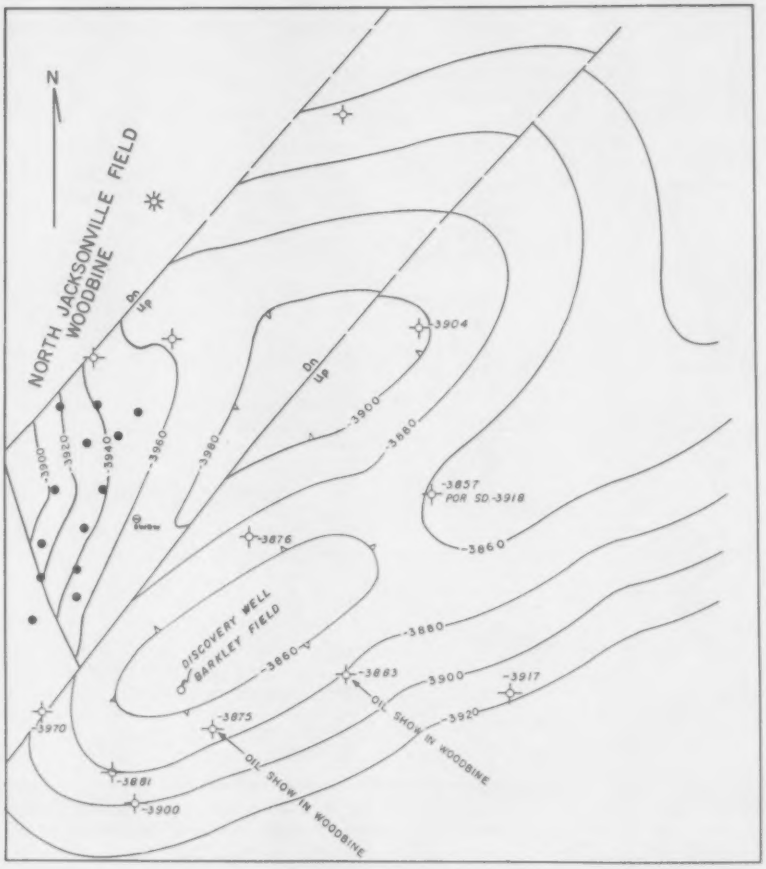
PROXIMITY TO PRODUCTION

	No. points
Maximum	43
Direct offset	43
Show of oil or gas (within approximately 1,000 ft.)	30
Within ½ to 3 miles of production	15
3 to 10 miles	5
10 to 20 miles	3
20 miles+	1

As may be seen from the chart, the method is based on three main topics, two of which are closely related. These topics are structure, stratigraphy, and the proximity to production, alliance of the latter two to be discussed later.

A maximum of 94 per cent is attainable through this method to allow for unusual conditions such as the shaleout of the pay zone on an inside location or other such unexpected hazards as will occur while drilling for oil. The minimum possible to achieve production by this method is 5 per cent; that is to say, a rank wildcat with little or no control and an unfavorable geophysical or surface geological report, a minimum penetration of one

Author is gelogist for Sinclair Oil & Gas Co., Tyler, Tex. Paper presented at the sixth annual meeting of the Gulf Coast Association of Geological Societies, San Antonio, 1956.



CHEROKEE COUNTY, TEXAS. Contoured on top of Woodbine. Interval, 20 ft. Contouring in Barkley area is shown prior to discovery well. Structure, 15 points, stratigraphy, 1 point plus 5 points for upper Woodbine shaleout in well to northeast, and proximity to production 30 points. Total 51 per cent. Fig. 2.

potential pay zone, at least 20 miles removed from production in that zone.

Structure

Most oil and gas accumulations are dependent upon structure of one type or another for their entrapment. Whether this is of the domal or anticlinal type of structure, with hundreds of feet of closure, or a broad gently dipping nose, with no closure whatsoever, is of no importance to this evaluation.

As long as the observer recognizes the anomaly as a potential oil or gas trap for any particular zone or zones in the immediate area, it may be classified as a structure for such zone or zones. The evaluation of the structure must depend upon the density of control wells involved in the interpretation.

Excellent . . . Structure definitely proved as a positive or otherwise favorable anomaly.

In a few instances an area may be so controlled on a relatively shallow horizon as to leave no doubt that the anomaly extends into older beds. A test to a deeper potential pay horizon within the known area of closure would receive the maximum point value possible under subsurface contouring alone, i.e., 32 points.

Field-development wells may of course fall into this category if control is sufficient to prove the location is above field water level. Inside locations are given points in addition to the 32 for structure as explained later.

The example (Fig. 1) is not meant to be a limiting factor as to type of structure in giving an area this rating. However, it must be kept in mind that any structure given the maximum rating must be of a type which has proved hydrocarbon trapping potential at least within the general area.

Good . . . Any possible structure which is controlled to the extent that there is only slight doubt to its validity should fall into this category.

Occasionally an area has sufficient control to strongly suggest the presence of a favorable anomaly. Uncommonly thin formations indicating structural growth, a sudden definite flattening or relaxing of regional dip (in areas where the regional dip is ordinarily uniform) etc., are among the many possibilities under this heading.

Again, the example (Fig. 2) is in no way meant to be a limiting factor in the scope of usage under the heading Good. It is predicted that 15 per cent of the initial tests drilled on this type of subsurface control alone will meet structure favorable for production.

Fair . . . Poorly controlled areas which exhibit possible favorable anomalies. Most areas with scant or moderate control may be contoured in a multitude of ways simply by varying the degree of regional dip without altering any other factors.

Undoubtedly a few of the favorable structures predicted under circumstances such as the above actually exist as hydrocarbon-bearing anomalies and at present await only drilling. However, most of these types of areas are found unproductive in the initial test. This initial test may of course point the way to future reserves by either its structural position or hydrocarbon shows, or may partially condemn the area. In either case under this evaluation only 5 per cent of the initial tests in an area of scarce control and without benefit of other information, such as seismic, surface geology, etc., should find structure favorable for oil entrapment.

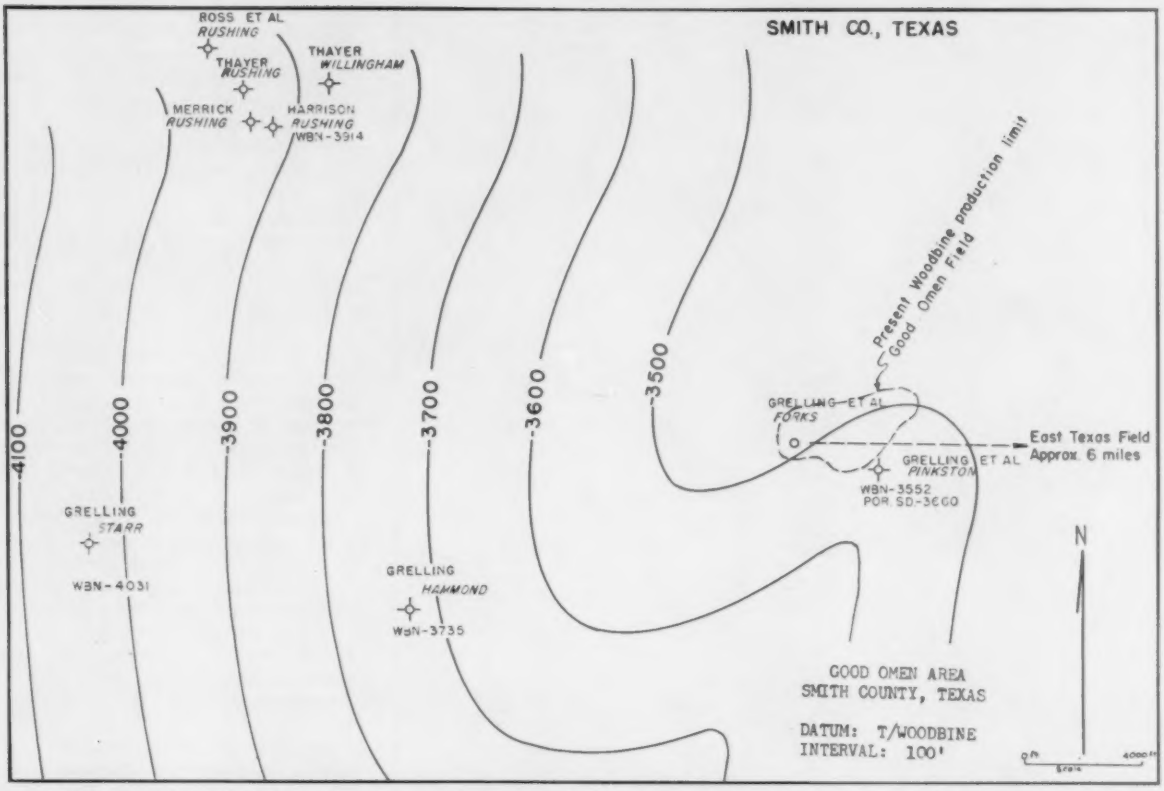
This example (Fig. 3) of a fair structural anomaly exhibits one of the possibilities in contouring such an area of meager control.

In addition to any of the above, a maximum of 10 points may be added to, or subtracted from the structural figure for such information as seismic control, surface geology, or other reliable means of detecting anomalous areas, or if the well is an inside location. A minimum of 3 per cent must be used in areas considered only fair by subsurface control and shown unfavorable by geophysics or surface geology.

Stratigraphy

This phase of the evaluation is based mainly upon the number of possible pay zones to be penetrated. The term, possible pay zones, refers to any zone which is productive in the general province and assumed to contain a potential reservoir within the immediate area. Points are given in increasing numbers for each such zone penetrated to a maximum of four points for four or more zones.

In addition to the above, a maximum of five points may be added should subsurface control indicate the termi-



ONE INTERPRETATION which may have been used prior to drilling the Grelling et al 1 Forks, discovery well for Good Omen field, Smith County, Texas. Evaluating: Structure, 5 points, stratigraphy 1 point plus 5 points for shaleout of upper Woodbine in Grelling et al 1 Pinkston, and proximity to production 5 points. Total 16 per cent. Fig. 3.

nation of a porous zone updip by means other than faulting.

This includes such phenomena as shaleout, sand bars, truncation, etc. Conversely, should the control indicate that a potential pay zone may be absent, or lies below known water level in the area of the test (field wells), this zone may not be included in the calculation. If the resultant number of zones is zero, the final calculated figure for the entire evaluation must be divided by 10.

Proximity to Production

This phase of the evaluation is strictly a measurable factor. Points are given in relation to the closeness of a proposed test to the nearest production from the zone or zones to be penetrated. Close alliance is seen between this phase of the evaluation and the general term stratigraphy, i.e. with proper structural conditions the closer a test is to production the better chance for meeting circumstances conducive to oil and gas accumulation.

This would, by nature, entail such factors as source beds and the porosity and permeability of the producing zone. A maximum of 43 is given for direct offsets to production and a minimum of one point for tests 20 miles or more removed from production in the zones to be tested.

After each phase of the method has been figured, the points are totaled and (unless the number of pay zones total zero as explained above) the evaluation is complete. Final disposition is a percentage which now necessarily represents only the relative chance for finding production between the tests in a given province.

It is hoped that further related study may disclose more sharply defined values for each individual province so an evaluation may be given which will represent the true chance of finding production for any test.

EXPLORATION HIGHLIGHTS

APPALACHIAN

WEST VIRGINIA

In Dry Fork district, Randolph County, West Virginia, Columbian Carbon Co. 1239 U.S.A. Department of Interior, elevation 3,448 ft., completed at 4,676,000 cu. ft., gas, chert 5,172 ft., gas 5,311 ft., and 5,420 ft., TD 5,522 ft.

● Plymouth district, Mercer County, United Fuel Gas Co. 2-8272 Sallie L. Bailey, had a final open flow of 273,000 cu. ft., gas after shot, rock pressure 200 psi., Maxon sand 1,484 ft., gas 1,490-1,525 ft., TD 1,927 ft.

OHIO

Preston Oil Co.'s second test in the new extension at Frazeysburg on 1 G. V. Hamby, Section 13, Jackson Township, Muskingum County, gaged 84 bbl. oil and 250,000 cu. ft. gas in 24 hours after fracturing the Clinton at 3,064-3,120 ft.

● A half-mile stepout along the west edge of Flint Ridge pool resulted in a small producer on 1 Harold Conrad, Lot 5, Hopewell Township, Licking County. Clinton was found at 3,070-3,110 ft. and made 35 bbl. in 24 hours after fracture.

● In the east end of Gratiot pool Mutual Oil & Gas Co. 2 Sam Decker,

Lot 34, Hopewell Township, Muskingum County, gaged 58 bbl. in 24 hours after the Clinton at 3,172-3,225 ft. was fractured.

PENNSYLVANIA

In Young Township, Indiana County, Southwest Pennsylvania, New York State Nautral Gas Corp. N-514 Florence Bodin, wildcat had a final gage of 348,000 cu. ft., gas, rock pressure 3,150 psi., Onondaga 7,327 ft., chert 7,343 ft., gas 7,495 ft., Oriskany sand 7,491-7,519 ft., TD 7,565 ft.

● Mount Pleasant Township, Westmoreland County, Peoples Natural Gas Co., 4100 Henry E. Leighty, was a failure and is being plugged, Tully 7,541 ft., Onondaga 8,425 ft., chert 8,480 ft., TD 8,679 ft.

EASTERN KENTUCKY

United Fuel Gas Co. is testing a gas show at their wildcat 8397 Kentland Coal & Coke Co. located on Lick Fork of Sugar Camp Branch of Bull Creek in Leslie County. Corniferous lime topped at 2,792 ft. and bottomed at 2,914 ft. had several gas showings in the section. However, after fracturing gas tested only 21,000 cu. ft. of gas daily. Operators are waiting on spudder.

CANADA

ALBERTA

Eight Discoveries Recorded During 7-Day Period

Companies searching for petroleum products in the vast network of underlying formations yet untapped in western Canada were rewarded with a higher than usual rate of success during the past 7-day period. Eight indicated discoveries were recorded during that period with four of those wildcats showing the presence of an oil accumulation and the other four indicating natural gas in commercial quantities. Two of those gas strikes in addition to omitting that product also showed that a light-gravity condensate was also contained in the formations that the discoveries were made.

Alberta's exploratory program accounted for three of the oil successes, one of the wet-gas strikes and the other two gas discoveries. Saskatchewan's activity gave up the other oil prospect while a well in northeastern British Columbia accounted for the remaining wet-gas strike.

● The most significant of Alberta's oil discoveries was recorded by Imperial Oil, Ltd., in the Carmangay area 30 miles north-northwest of Lethbridge city and 24 miles east of Sinclair Canada Oil Co.'s oil successes in the Claresholm are. This well, Imperial 4-17 Carmangay, on LSD 4, 17-13-23w4, tested the basal Banff formation and recovered 6,200 ft. of gassy sulfurous medium-gravity oil. There was no evidence of water on the single test run of a 55-ft. interval, 600 ft. below the formation contact point. Operations are again under way at the venture and further testing is anticipated to fully evaluate the find.

● The other two wells which indicated oil success in Alberta during the period under review both fall in the central-west sector of the province. One of those is being drilled as a Devonian test by Creek Oils of Canada, Ltd., and lies near the town of Rimbey while the

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other lies in the Gilby West oil pool and was drilled primarily as a Viking sand development well by Hudson's Bay Oil & Gas Co., Ltd. The Creex operated test, 1-2 Rimbey, on LSD 1, 2-43-2w5, while drilling towards its main objective, ran into porosity in the Viking horizon and drill-stem test run in that zone gave up a pipe recovery of 400 ft. of clean oil and 110 ft. of mud-cut oil. Crew has since resumed drilling operations. Meanwhile, the Hudson's Bay venture, 4-18 Gilby West, LSD 4, 18-41-3w5, found porosity in the Viking, or main producing zone in that field, tight, hence the well was carried down to the Mississippian where an oil zone was encountered. Final production tests on this well are still forthcoming but it was released by the company that up to 54 bbl. of clean oil had been recovered during a 12-hour swabbing period.

● The two dry gas discoveries were both recorded by Hudson's Bay Oil & Gas Co. at wells being drilled jointly with Union Oil Co. of California, Ltd., and are in the northern district of this province. One lies in the Kaybob district, 22 miles northwest of the previously announced Whitecourt area discovery while the other is near Hotchkiss townsite, 70 miles north of Peace River.

The Kaybob area wellsite, H-B.-Union 1 East Kaybob, on LSD 6, 20-61-18w5, flowed gas at maximum daily rate of 1,500 M.c.f. from the Viking sand during a recent drill-stem test. Earlier tests at the well and reported previously, had also indicated gas production in the basal Cretaceous horizon. Casing is being run at the present time at this venture.

● The other H.B.-Union test, 2 East Peace River, on LSD 7, 34-94-18w5, indicated its success when drill-stem test in the basal Quartz zone, around the 1,100-ft. level gave up gas at a rate of just over 1,000 M.c.f. daily. Drilling is proceeding at this well which is scheduled to test the pre-Cambrian horizon.

West Whitecourt Wildcat Is Success

A wildcat well in the West Whitecourt area of western Alberta has recovered oil and gas on a drill-stem test, according to Stanolind Oil & Gas Co., a joint-interest owner.

The 15-25 Silver Creek, located in LSD 15, 25-60n-16w5, recovered gas at the rate of 10,000 M.c.f. a day and 990 ft. of 40°-gravity oil from the D-3 reef, topped at 8,464 ft.

The test was at the interval 8,464-80 with gas to surface in 2 minutes, accompanied by a spray of oil. The operator, Canadian Petrofina, Ltd., is coring ahead.

Stanolind and Hudson's Bay Oil & Gas Co., Ltd., own 42 per cent interest each, and Canadian Petrofina 16 per cent interest in a million-acre block in the area.

The West Whitecourt area is located about 150 miles northwest of Edmonton. The 15-25 Silver Creek is the third well drilled in the immediate area and is about 6 miles northwest of the previously completed wells. The earlier wells were completed as gas distillate producers and are now shut in awaiting a market.

SASKATCHEWAN

Imperial Oil, Ltd., who has had a tremendous amount of success in the Mississippian formation at wells drilled in the southeastern sector of that province, again discovered oil during drill-stem test operations at an exploratory well. This new strike, Imperial 13-13 Goldridge, drilled on LSD 13, 13-4-2w2, lies 5 miles north of Oxbow townsite and is 38 miles northeast of Estevan.

The Mission Canyon zone of the Mississippian formation was contacted around the 4,180-ft. level and four tests conducted below that level gave up en-

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couraging oil recoveries. Production casing has been run at the hole and further tests will be run in the near future.

BRITISH COLUMBIA

The British Columbia wildcat, drilled by Phillips Petroleum Co. of Oklahoma, lies in the Halfway Lake area, 55 miles northwest of Fort St. John townsite. During a series of three drill-stem tests run in the Permo-Pennsylvanian formation a maximum gas flow rate of just over 11,000 M.c.f. daily was recorded and pipe recovery on the third evaluation test also indicated the presence of liquid hydrocarbons.

The well, Phillips 1 Townsend, is located at 56 degrees 35 minutes 36.24 seconds North Latitude and 122 degrees 6 minutes 56.80 seconds West Longitude is 7 miles northwest of the firm's 1 Kobes gas discovery well.

It is being drilled by Phillips on acreage farmed out to it by Fort St. John Petroleums of Vancouver. Under terms of that agreement, Phillips is required to drill two wells to the Triassic formation and in return will earn a 50 per cent interest in the wells and near 30,000 acres of land included in the deal.

KANSAS

SOUTHWEST KANSAS

Haskell County Well Assured Morrow Production

Trees Oil Co. and Associates 1 Moore, C NW NW 21-30s-34w, 3 miles west of Santana, southwestern Haskell County, is assured of Morrow production. A drill-stem test at 5,350-80 ft. gaged 1,000 M.c.f. of gas per day. Recovery was 540 ft. of oil-cut mud, 485 ft. heavily oil and gas-cut mud, and 1,500 ft. of free oil. The deep prospect is located deep inside Hugoton field Permian production.

LOUISIANA

NORTH LOUISIANA

Confirmation Completed At Patton Church

The confirmation well to Patton Church field in Catahoula Parish, eastern Louisiana, was completed flowing 160 bbl. of oil per day on 10/64-in. choke from perforations at 4,463-66 ft. The discovery confirmation is Gulf Oil Corp. 2 Catahoula Bank, SW SE 13-8n-6e, the northeast diagonal offset to the field discovery well, H. L. Rowley 1 Renfrow, NE NW 24-8n-6e.

SOUTH LOUISIANA

Extension Oil Discovery Enlivens Lockport Play

Development around the old Lockport dome southwest of Lake Charles, in Calcasieu Parish, got another boost last week with the discovery of a new oil reservoir in an 8,800-ft. Hackberry sand off the northeast flank.

Discovery was by Sun Oil Co. at its 1 Lock-Moore, in 4-10s-9w, just southeast of Maplewood townsite, just across Calcasieu River from Lake Charles. The well's flow the first 2 hours through ⅛-in. choke was at the rate of more than 400 bbl. per day with pressure of 3,450 psi. The next 4 hours, with 3/32-in. choke, the flow was at the rate of 192 bbl. per day, gaging pressure of 3,475 psi.

Gravity of the oil is 29.2°. Gas-oil ratio was 930 cu. ft. per barrel through the ⅛-in. choke, and 914 cu. ft. per barrel through the 3/32-in. choke. The well has been shut in, with pressure of 3,550 psi., pending erection of tankage.

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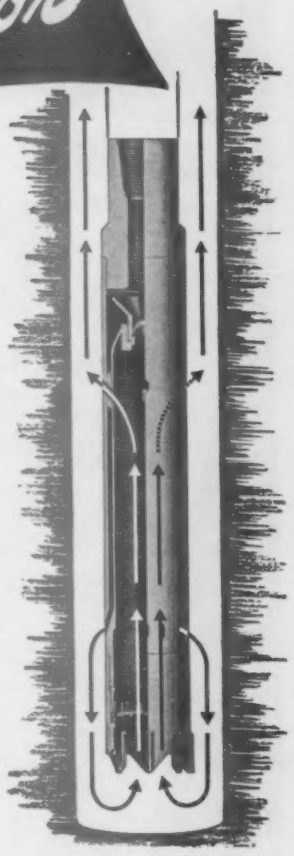

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gas-condensate area, newly developed by Quintana Petroleum Co. and California Co. with production from 9,200-9,600 ft. Hackberry sands. Additional development has been going on the past year around the east and southeast flanks of the dome.

Lockport was discovered in 1924 with initial production from relatively shallow Miocene sands. Present production is from a multiplicity of sands extending from the Miocene through Discorbis, Anahuac (Marginulina), and Hackberry (Frio) horizons, and ranging in depths from 3,100 to below 9,600 ft.

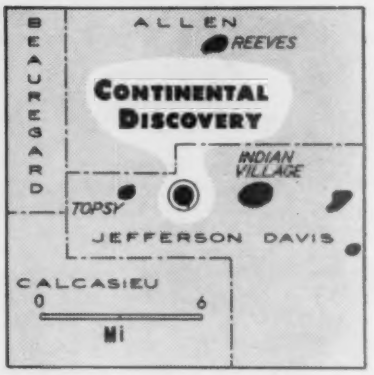
Sun's well was drilled to 10,005 ft. Tests in a 9,550-ft. sand, and also in a 9,050-ft. sand, got water.

Linking Gasser Narrows Indian Village-Topsy Gap

Continental Oil Co. is opening another productive area in the panhandle arm of northwestern Jefferson Davis Parish. Its discovery well, 1 Quatre, in 26-7s-7w, is about 2½ miles west of Indian Village field, and about midway between it and The Texas Co.'s one-well Topsy field.

Production is from Frio sand perforated at 8,390-8,409 ft. which tested gas with a spray of condensate. Flow through small chokes was at the rate of more than 2,500,000 cu. ft. of gas per day. Pressure through ¼-in. choke was 2,400 psi., and through 7/32-in. choke 2,400 psi. Shut-in pressure is 2,950 psi.

Main production at Indian Village is from the Frio-Ortego sand at 7,100-50 ft. A 4,900-ft. Miocene sand yields gas. The deeper pay is oil. The one well at Topsy produces oil from a Marginulina-Anuahac sand at 6,100 ft.



Location of Continental Oil Co.'s newly completed gas-discovery well in northwestern Jefferson Davis Parish.

Tigre Lagoon Extension Stretches Toward Erath

A possible linking of the large Tigre Lagoon and Erath fields, southeast of Abbeville, in eastern Vermilion Parish, is indicated by a discovery well drilled by H. S. Cole, Jr., ¾ mile west of the northwestern end of the former field. Its location also is only a little more than 1 mile east of Erath field.

The well, 1 Broussard, in 23-13s-4e, is completed in pay interval of 11,194-11,212 ft. after drilling to 12,334 ft. It produced 108 bbl. of 52.4°-gravity condensate and 3,400,000 cu. ft. of gas per day during a test through 7/32-in. choke. Its pressure was 3,640 psi.

Production limits of Erath field have been extended northwestward with a new-pay discovery by Tidewater Oil Co. Extension well, 1 Broussard, flowed 256 bbl. of 36.1°-gravity oil per day through ⅛-in. choke from perforations at 12,480-84 ft. in Miocene sand. Flow was under pressure of 1,900 psi. and with gas-oil ratio of 680 cu. ft. per barrel. Hole had been taken to 13, 000 ft.

MICHIGAN

A new Mills Township, Midland County wildcat was being prepared for test and completion at Granville C. Berlin 1 Asakevich, SW SW SW 1-16n-2e.

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This wildcat, located about 1½ miles southeast of the Bentley Dundee oil pool, logged top of Dundee at 3,366 ft. Pay showed from 3,460-62 ft., present total depth. Hole carried 300 ft. free oil natural in 12 hours with a good head of gas. This natural fill-up appeared to be comparable to several of the commercial Bentley field completions prior to acid treatment. Long string of 5-in. casing was run and cemented in at 3,389 ft. About 15 bbl. of oil were circulated from well when casing was cemented. This interesting wildcat may be deepened further in Dundee after cement is drilled out.

Berlin and associates control a drilling block spread of about 320 acres in this area. Block was farmed from the Carter Oil Co. which controls the bulk of the other close-in acreage and supported this wildcat with a dry hole commitment.

- First two offset Traverse oil tests in both the extended Edmore field, Montcalm County, and the new Gilbert Lake field, Colfax Township, Oceana County, were drilled out dry in objective pay horizons.
- In Edmore pool, E. Edwin Brehm 2 Peterson, SW NW NW 11-12n-6w, diagonal southwest offset to extension producer, was bottomed out dry in Traverse lime at 5,158 ft. with no oil, gas or water showing.
- In Gilbert Lake pool, Socony-Mobil Oil Co. was drilling deeper headed for Dundee-Reed City zone after objective Traverse pay was logged low and drilled dry at its 1 Packard et al, NW SW NW 35-16n-15w, with Traverse water showing 2,065-70 ft. This is the northeast diagonal 20-acre offset to lone discovery well.

MISSISSIPPI

Wilcox Discovery Opens Wilkinson County Field

Mississippi's first Wilcox discovery of the year is 2¾ miles southwest of Doloroso, in northern Wilkinson County. The new field has been named officially as "Rose Hill" after the plantation on which the discovery well is located.

Discovery is by Rimrock-Tidelands, Inc., at its 1-A Baggs, in 47-4n-3w. Its production, 100 bbl. of 36°-gravity oil per day through ⅞-in. choke, is from the Barksdale zone, perforated at 7,245-51 ft. Bottom of the hole is 7,615 ft.

California Co.'s new Lower Cretaceous field, in Smith County, has been designated officially as "Raleigh." Its discovery well, completed early in January, opening the state's first field of the year, is about 5 miles southwest of the town of that name.

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NEW MEXICO

SOUTHEAST NEW MEXICO

Northern Lea County Gets Pennsylvanian Well

Pennsylvanian production has been opened in northern Lea County, 10 miles northeast of Tatum, at Magnolia Petroleum Co. 1 Dickinson heirs, 33-10s-36e.

The well was completed for a calculated daily rate of 147 bbl. of oil a day after flowing 55 bbl. of new oil in 9 hours through 48/64-in. choke.

Final perforations were at 11,504-17, 11,524-31, 11,540-48 and 11,550-62 ft.

Lone Star Gas Co. 1 Marley, wildcat east of Moore-Pennsylvanian field, flowed gas at the rate of 2,000 M.c.f. daily, and an estimated 20 bbl. of oil and water an hour on drill-stem test of the Pennsylvanian at 11,061-11,177 ft. The test was through ⅝-in. choke, with maximum flowing pressure at 2,235 psi.

Field Well Makes Heavy Flow

Sunray Mid-Continent Oil Co. 1 Adamson, a southwest extension on the eastern edge of North Gladiola field in eastern Lea County, reported a flow of 101 bbl. of oil in 45 minutes. This was calculated at the rate of 135 bbl. an hour, or 3,240 bbl. per day.

The flow was made while testing the Devonian at 11,994-12,035 ft. Gravity of the oil was 48°, and surface flowing pressure read 200 psi. Bottom-hole flowing pressure ranged from 3,235-4,525 psi., and shut-in pressure was 4,745 psi.

Location is NW SW 5-12s-38e, about 5 miles northwest of Bronco.

OKLAHOMA

OKLAHOMA PANHANDLE

Phillips Hits Oil at Beaver County Wildcat

A remote wildcat test in western Beaver County in the Oklahoma Panhandle appears to be a Chester-Missis-

Phillips Petroleum Co. has a Chester discovery in line at its 1 Blakemore, 9 miles northwest of nearest production in Beaver County.

sippian discovery. Phillips Petroleum Co. 1 Blakemore, C NW SE 36-4n-20eCM, 9 miles northwest of closest production at Southeast Boyd, recovered 5,780 ft. of 36°-gravity oil on drill-stem test at 6,524-58 ft. The oil was slightly gas-cut. Drilling is now below 7,471 ft. with 9,000 ft. the objective.

SOUTHWEST OKLAHOMA

B.A. Stakes Well No. 5 at Knox Deep

A fifth location has been staked on the deep Knox structure in Grady County by British-American Oil Producing Co. The latest well is in 28-3n-5w. Earlier, the company had staked the 1 Teter in SW NE 18-3n-5w, planning to take the well to 15,500 ft. in the Ordovician.

Other wells active in this deep Oklahoma play are: the 1 Reed, SW SW NE 20-3n-5w. This well was per-

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Export Representative: International Oil Equipment Co. 30 Rockefeller Plaza, New York City

forated in the second Bromide sand at 15,220-90 ft. Recovery was 130 ft. of slightly gas-cut mud plus the water cushion. Another zone at 15,290-15,319 ft. is to be tested. Total depth of this important well is 15,772 ft. Casing at 15,748 ft.

It is at Knox that British-American set Oklahoma's deepest producing-depth record last year at 2 Harrison. That well was a prolific gas-condensate producer at 15,310 ft.

SOUTH-CENTRAL OKLAHOMA

Bromide Discovery Flows Oil in Cleveland Area

A Bromide-Ordovician discovery east of East Noble in Cleveland County flowed 2 bbl. of oil per hour on 6/64-in. choke from perforations at 7,170-71 ft. in the Bromide sand. Oil Capitol Corp. 1 Allen is the well. Location is in SE SE NE 32-8n-1w.

Northeast Payne Adds Third Oil Producer

Atlantic Refining Co.'s 1 Little is the third well in fast-growing Northeast Payne pool, a Hunton lime and Bromide sand producing area in McClain County. The well, located in C SW NE 4-5n-3w, flowed 11 bbl. of oil per hour on 18/64-in. choke from Hunton lime perforations at 8,730-50 ft.

NORTHWEST OKLAHOMA

Offset Tries Announced At Harper Discoveries

Two important offset wells have been announced for two new Harper County discovery areas. Eason Oil Co. and Wilcox Oil Co. will drill the 1 Price-Palmer in C NW NW 28-26n-23w, southwest of the 1 Price discovery well in C NE SW 21-26n-23w, a 16-bbl.-per-hour Tonkawa - Pennsylvanian strike at 5,490-92 ft.

Midwest Oil Co. 1 Stinson Unit in SW NW SE 31-28n-25w will offset An-Son Petroleum Corp.'s 1 Freeman discovery area in C NW NW 6-27n-25w. The new well is 1 mile north of the 1 Freeman which was completed as a Morrow gas discovery last year at 6,520-30 ft.

ROCKY MOUNTAIN

UTAH

Oil Flow Reported at North Desert Creek

Shell Oil Co.'s 22-12 North Desert Creek well in San Juan County flowed oil at the daily rate of 720 bbl. on drill-stem test at 5,275-5,340 ft. Pay is the upper Hermosa-Pennsylvanian.

This new producer is ½ mile northwest of other drilling in the field. Production at the field's two wells is from the Paradox.

The field's record . . . The discovery well of this Paradox basin area was the 1 North Desert Creek. That well flowed 1,440 bbl. of oil per day at 5,578-86 ft. in the Paradox-Pennsylvanian. Superior Oil Co. added the second well to the field at 1 Navajo-B, N½ SW SW 7-41s-24e. This one flowed 1,402 bbl. per day.

● Phillips Petroleum Co. announced that the Phillips-Aztec 1 Desert "A" well tested at a daily rate of 1,308 bbl. of 40.4°-gravity oil and 1,000 M.c.f. of gas. The well is on a Phillips and Aztec equal interest 5,120-acre block.

. . . The test was at 6,080 ft. through open tubing in 3 ft. of perforations at the lower level of porosity in the Paradox lime. The overlying main portion of the zone will also be tested.

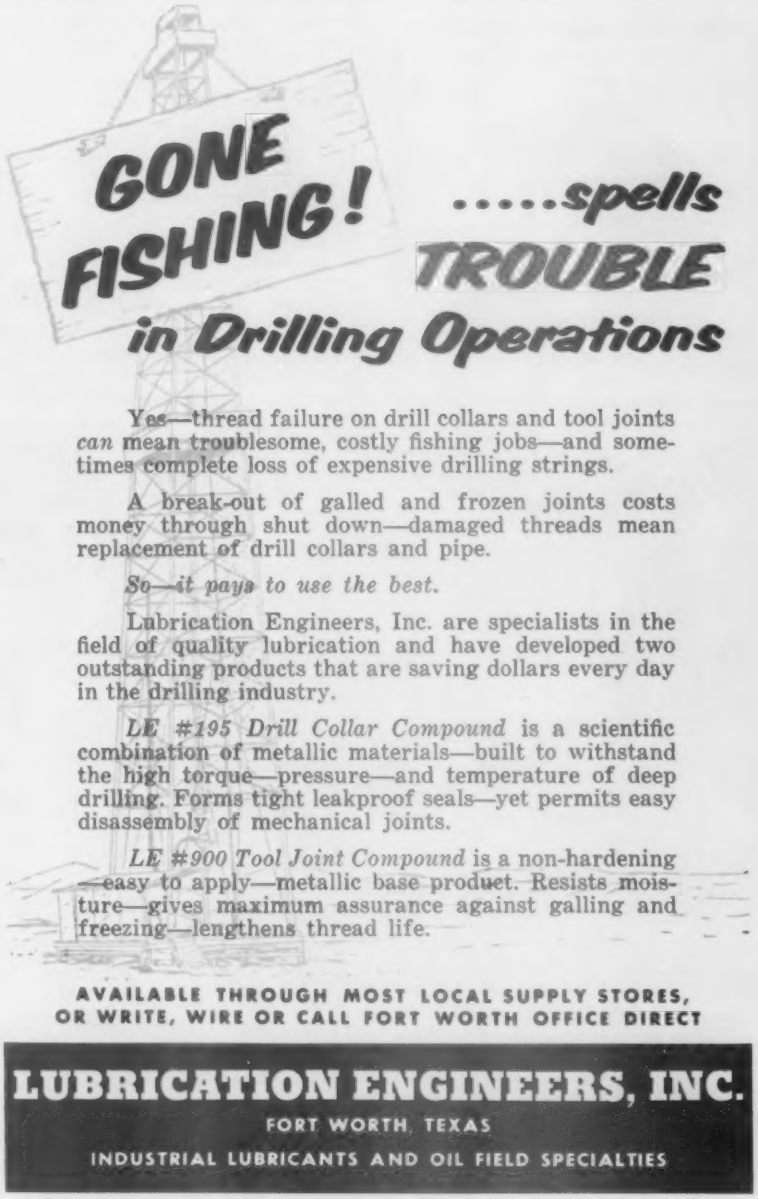
. . . The 1 Desert "A" is ½ mile southeast of Shell and Superior's wells.

TEXAS

SOUTHWEST TEXAS

Val Verde Deep Test Fails

Humble Oil & Refining Co. has given up at another deep test in Texas' far-southwestern Val Verde County.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Its 1 Emma Wardlaw, 15 miles southeast of Juno, in Section 53, Block D, GC&SF Survey, proved dry after drilling to 15,295 ft. Drilling had been under way since March 1956.

Shallow Discovery Revives Old Chittim Ranch Area

The old Chittim Ranch area of Maverick County came back into the exploration picture again with a shallow-pay and extension discovery by Rycade Oil Corp. This company's discovery well, 1 Annie E. Chittim, in Section 131, more than 1½ miles southwest of old development, marked the first new work in the area in many years.

Rycade's new well is rated good for 115 bbl. of oil per day, flowing through ⅛-in. choke from open hole at 1,440-42 ft., believed to be Austin chalk. Previous production has been gas and condensate from Glen Rose sands at 5,500 to 5,600 ft., with one small oil well from Georgetown lime at 3,200 ft. First production was in 1929.

Location is 18 to 20 miles northeast of Eagle Pass. It was the county's only commercial produtcive area until 1955, when Continental Oil Co. opened Scatosa field, 10 miles southeast on the Chittim Ranch anticline, with oil production from Eagleford. So far only the initial test in this area has proved productive. In the meantime (August 1956), Sutton Oil Co. has opened a shallow (1,200-1,300 ft.) Olmos oil-productive area about 11 miles farther southeast near the Dimmit County line.

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Hidalgo's Flores Area Gets Good Oil Producer

Sunray Mid-Continent Oil Co. has given the Flores area, 12 miles northeast of Sullivan City, in Hidalgo County, Rio Grande Valley, another good oil producer.

Its 5 Zamora, in the W. D. Parchman Survey, flowed at the rate of 168 bbl. of clean oil per day while on 5/32-in. choke. Completion is in the upper Sullivan sand, perforated at 4,483-89 ft. Total depth is 4,531 ft. Flow was under pressure of 640 psi. with gas-oil ratio of 595 cu. ft. per barrel.

Location is slightly more than ½ mile from the Starr County line, on the west. Nearest production, in Sunray's 4 Zamora, 1,150 ft. south, is gas.

WEST TEXAS

Ellenburger at Halley Field

Halley field in southern Winkler County has gained its third deep pay, and fourth producing zone for the area. Stanolind Oil & Gas Co. 3 G. P. Mitchell "B," a ½-mile southwest extension on the southern edge of the field, completed for 344 bbl. of 41° oil a day from the Ellenburger. Choke size was not reported. Final perforations were from 12,126-38 ft. Flowing tubing pressure was 2,150 psi. and gas-oil ratio was 1,630:1.

Halley field produces from the Devonian, Montoya, plus the Yates and Seven Rivers. Its location is within the so-called "trend" area of Winkler County that has come in for extensive Ellenburger and Devonian exploration over the past year, with many successes in the North Monahans and Kermit districts.

Location of Stanolind's well is in the SW SW Section 22, Block B11, PSL Survey, 12 miles southeast of Wink. Formation tops, on elevation of 2,768 ft. were: Devonian 9,440 ft., Silurian

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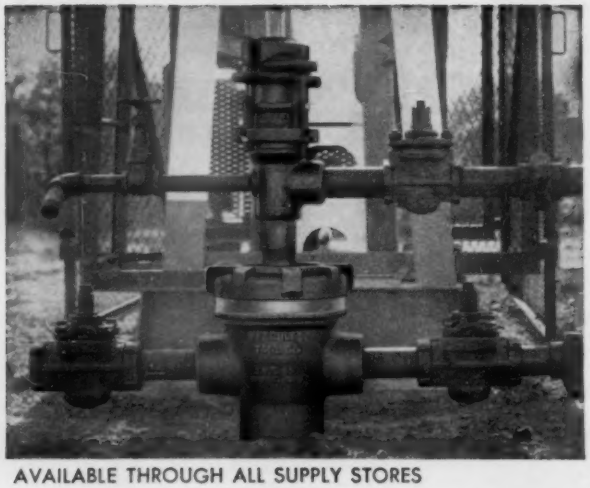

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Map shows Halley and North Monahans field in southern Winkler County. Geological location is on the western side of Central basin platform.

9,700 ft., Simpson 10,670 ft., and Ellenburger 11,510 ft. Total depth was 12,220 ft. plugged back to 12,180 ft.

Dry hole at N. Monahans . . . This field, which has enjoyed a long run of Ellenburger development and extensions, got a dry hole ½ mile northeast of production.

J. C. Maxwell 1 Mitchell in SW SW 23-B10-PSL, was dry at 10,990 ft., total depth. Sample top on the Devonian at 10,485 ft. was reported to be 1,085 ft. low to other wells in the field.

Scurry County New Pay Makes High Flow

American Trading & Production Corp. 1-B Howell, 62-3-H&TC, has added Canyon sand pay to Hermleigh field, 12 miles east of Snyder.

On potential test the well flowed 386 bbl. of 37° oil a day with no water, through 20/64-in. choke. Perforations were between 6,203-12 and 6,218-23 ft. Tubing pressure was 250 psi.

Hermleigh field produces from the Ellenburger and Strawn.

Delaware Basin Wildcat Still Testing

Shell Oil Co.'s wildcat on the eastern rim of the Delaware basin reported another flow of gas and distillate from the Pennsylvanian.

Perforations at 14,028-62 ft. were treated with 2,000 gal. of acid. When opened, under 20/64-in. choke, the well returned load water in 30 minutes, then on a 12-hour gage made 147 bbl. of 56° distillate, with maximum gas flow at the rate of 2,439,000 cu. ft. daily. Flowing tubing pressure was 2,700 psi.

EAST TEXAS

Gas-Distillate Flow At Smackover Strike

The Texas Co. 1 Edens, Navarro County Smackover prospect 2½ miles north of Navarro townsite, reported another flow of gas and distillate, and was shut in when pressure started building up.

Operators perforated the Smackover limestone at 8,869-8,900 ft., and swabbed it in. It flowed to pits, then was turned to tanks where it made 30 bbl. of fluid in 6 hours on 24/64-in. choke. Gravity of the oil was 61°.

Choke size was changed to 12/64-in. and casing pressure at the wellhead increased from 650 to 1,025 psi., and tubing pressure rose from 2,450 to 2,950 psi. Fluid reports said the gage blew off at that point and the well was shut in.

Anderson County Gets Deep Wildcat

A 9,500-ft. Travis Peak wildcat has been scheduled by Sunray Mid-Continent Oil Co., to be drilled 4 miles south of Blackfoot townsite and 3 miles north of the northeast end of Tennes-

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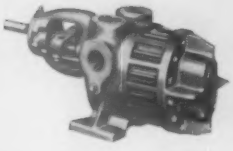

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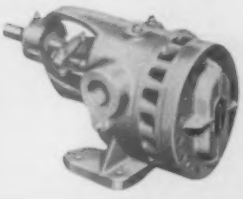

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see Colony field in Anderson County.

The project will be 1 J. P. Smith, on a 99-acre trace in the Cason O'Bar Survey.

TEXAS PANHANDLE

Workover Well Is New Pay Gas Hit for Quinduno

Quinduno field, south-central Roberts County, added a LeCompton gas discovery area at Gulf Oil Corp. 3 John Haggard, 8 miles northwest of Miami.

The well had a calculated absolute open flow of 4,200 M.c.f. of gas per day plus condensate. Pay is 6,220-82 ft. in the LeCompton. Quinduno oil field produces from the Permian Brown dolomite.

TEXAS GULF COAST

Cockfield Pays Off Again As Addicks Area Spreads

Gas-condensate production found by Cerro De Pasco Corp. and C. H. Osmond in their Tim Miles wildcat is the latest in a succession of Cockfield-Yegua discoveries during the past year in the Addicks-Alief-Clodine area, just west of Houston, in southwestern Harris and northeastern Fort Bend counties.

The De Pasco-Osmond discovery is 2½ miles south of Addicks, on the Harris County side of the line. It is 1½ miles east of Slick Oil Co.'s recent gas discovery, and about 2 miles north of the Northeast Clodine area.

Its pay is perforated at 7,260-74 ft. Open-flow production is placed at 41,000,000 cu. ft. of gas per day. Flow through 7/32-in. choke at 2,560,000 cu. ft. of gas per day was under pressure of 2,584 psi. Shut-in pressure is 2,685 ft. Gas sprayed condensate, but liquid volume was ungaged.

Two Gas Producers Open New Harris County Area

Slick Oil Co. has found Cockfield gas production in two wells just north of Rotherwood, in northern Harris County. The new area is about 1½ miles southeast of East Huffsmith field, and about the same distance northwest of production at Rotherwood. A possible link between the two fields is suggested.

First of the two wells completed, and credited as the discovery well, is 2 Peden Heirs, which has an open-flow potential rating of 15,000,000 cu. ft. of gas per day. Gas-liquid ratio measured 158,000 cu. ft. per barrel. Shut-in pressure is 2,050 psi. Pay is perforated at 5,954 ft. with bottom of the hole at 7,100 ft.

Following this completion, operators went back in the initial test, 1 Peden Heirs, which had been "temporarily abandoned" last month at total depth of 7,080 ft. Cockfield sand was perforated at 5,928-30 ft., and the well completed with an open-flow potential of 17,500,000 cu. ft. of gas per day. Shut-in pressure is 1,995 psi.

NORTH TEXAS

Wise County Field Well Flows 524 BOPD

Bill McCommons 1 Baptist Church, a development well in the Caughlin-Strawn field of north-central Wise County, has been completed for a calculated daily rate of 524 bbl. of oil. The daily rate was based on a 12-hour flow of 262.03 bbl. of 40.7° oil through ⅜-in. choke. Tubing pressure was 280 psi. and gas-oil ratio 741:1. Operators drilled to 4,018 ft., and completed through perforations at 3,968-86 ft.

Location is 4 miles east of the town of Chico, in John Cauglin Survey, A-15.

Knox County . . . Ray Smith Drilling Co. 1 Frances Hill, Tannehill sand prospect 3 miles southeast of Munday, in S. Washburn Survey, recovered 90 ft.

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of free oil, plus oil and gas-cut mud on a drill-stem test in sand at 1,783-88 ft. Maximum flowing pressure was 85 psi. and shut-in pressure read 640 psi.

Recovery of oil on drill-stem test has assured the East Texoma field of a ½-mile east extension at Lomax & Maxwell 1-B Cartwright. The test was run from 1,745-61 ft. Recovery in 1 hour was 400 ft. of oil and 100 ft. of heavily oil and gas-cut mud. Location is 2 miles east of Goree, in Section 71, Block 45, H&TC Survey.

Successful Wildcats

ILLINOIS

Douglas County: Lowell G. Ewart 1 Nellie Applegate, SW 26-15n-7e. IPP 10 BOPD, 50 BWPD, Rosiclare 1,747-57 ft. TD 1,757 ft. Extension to Chesterville pool.

Saline County: Jack Ingils 1 Belt Kellin, NW NE NE 11-8s-5e. IPP 14 BOPD, 5 BWPD, Aux Vases 2,929-54 ft. TD 3,125 ft. Extension to Harco pool.

Pike County: S. & S. Oil Co. 1 Hillman, NE NW SW 2-4s-4w. IP 73 M.c.f. of gas per day, Silurian 475-89 ft. TD 489 ft. Extension to Fishhook pool.

White County: W. C. McBride, Inc., 1 J. B. Jackobs, NE NW NW 34-4s-9e. IPP 17 BOPD, 22 BWPD, Tar Springs 2,548-58 ft. Bethel 3,025-40 ft. TD 3,224 ft.

Eakle & Holder Petroleum Co. 2 Roy Pearce, SW SW SE 35-6s-10e. IPP 241 BOPD, Renault lime 2,806-12 ft. TD 2,901 ft. New pay in Maunie South pool.

INDIANA

Gibson County: Coy Oil, Inc., 2 P. H. Key et al, NE NE NW 21-2s-11w. IPP 110 BOPD, 50 BWPD, Cypress sand 2,016-29 ft. Benoist 2,180-86 ft., 2,192-98 ft. New pay (Cypress) in King pool.

C. E. O'Neal 1 J. C. Reed, SE NE SW 28-2s-11w. IPP 157 BOPD, Benoist 2,201-06 ft. TD 2,435 ft. Extension to King pool.

KENTUCKY

Breckenridge County: Vogler & Vogler 1 I. L. Taul, 1-O-35. IPP 5 BOPD, Jackson 292-305 ft. TD 305 ft. Discovery of North Tark Fork pool.

E. Allen 1 H. Mattingly, 21-P-35. IPP 3½ BOPD, Jackson 405-415 ft. TD 415 ft. Discovery of Balltown pool.

Hopkins County: H. E. Walton Oil Co. 1 Dixon, 3-I-25. IP 1,500 M.c.f. of gas per day, Tar Springs 1,516-21 ft. TD 2,239 ft. Discovery of Mortons Gap pool.

Pure Oil Co. 5 West Kentucky Coal Co. "A," 4-J-24. IPP 187 BOPD, O'Hara 2,485-87 ft. TD 2,660 ft. Discovery of West Madison pool.

I. B. Browning and Sons 2 E. King, 14-L-24. IPP 40 BOPD, O'Hara 3,276-90 ft. TD 3,381 ft. Discovery of Slaughter's South pool.

McLean County: Hupp Oil Co. and Felmont 1 A. & H. Hall, 2-L-28. IPP 125 BOPD, Lower Renault porosity 1,743-54 ft. TD 3,660 ft. New pay in Bates Knob pool.

Ohio County: Mount Carmel Drilling Co. and Yunker 1 L. Wilson, 2-L-34. IPP 4 BOPD, Benoist 778-86 ft. TD 790 ft. Discovery of Dan pool.

NORTH LOUISIANA

Bossier Parish: Midwest Oil Corp. 1 Bruce Cartwright, C SW SW 34-23n-13w. IPP 73 BOPD, 38.8° gravity. Pettet 6,349-57 ft. TD 7,412 ft. New pay in Plain Dealing pool.

Franklin Parish: Jones-O'Brien, Inc., and Custer K. Primos 1 M. Franks, C NW SE 36-16n-7e. IPP 50 BOPD, 20 BWPD, Tuscaloosa 3,622-26 ft. TD 4,221 ft. Discovery of West Baskinton pool.

Tensas Parish: M. T. Halbouty 1 Fisher Lumber Co., C NE SE 24-12n-10e. IP 2,000 M.c.f. of gas per day, 160 BDPD, 62° gravity, 15 BWPD, Tuscaloosa Massive sand, 8,372-80 ft. TD 8,429 ft. Discovery tentatively called Young Bayou pool.

SOUTH LOUISIANA

Acadia Parish: Hunt Oil Co. 1 Colbert Thibodeaux, 69-10s-2w. IP 2,560 M.c.f. daily, 59 BC per M.M.c.f., 46.8°, perfs. 13,186-90 ft. (Frio). TD 13,650 ft. (New field—3 miles southwest of Midland field.)

Gulf Interstate Engineering Co. 1 Jeffers, 23-10s-1e. IP 29 BCPD and 1,490 M.c.f. daily, 7/64-in., 52°, perfs. 10,224-34 ft. TD 10,301 ft. (Extension and new pay in South Crowley area—½ mile northeast of production.)

Beauregard Parish: Slick Oil Co. 1-B Musser Davis, 17-6s-11w (1 mile northeast of West Oretta field). IP 1,000 M.c.f. daily, spray condensate, 5/32-in., 58°, perfs. 8,148-51 ft., and (dual completion) 67 BOPD, 7/64-in., 48°, GOR 2,000 cu. ft. per barrel, perfs. 8,426-29 ft. TD 8,984 ft. (New field.)

Cameron Parish: California Co. 2-A OCS 0541, Blk. 160, East Cameron area, Gulf of Mexico. IP 115 BOPD, 1/16-in., 35.8°, GOR 1,281 cu. ft. per barrel, perfs. 11,330-38 ft. TD 12,303 ft. (Confirmation well and new pay in East Cameron Blk. 160 field.)

Jefferson Davis Parish: Union Oil & Gas Corp. 2 Roach, 35-10s-4w. Shutin gas

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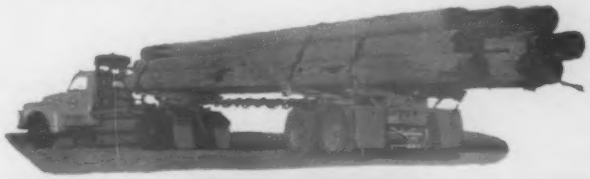

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SINCE 1916

well, no gage, lower Frio 15,224-15,305 ft. in open hole 15,002-15-461 ft. TD 15,461 ft. (New pay in Lake Arthur field.)

Plaquemines Parish: California Co. 1 State 1263 (OCS 0374), Blk. 41, Main Pass area, Gulf of Mexico. IP 210 BOPD, 9/64-in., 29.2°, GOR 1,380 cu. ft. per barrel, perfs. 7,091-7,115 ft. TD 9,235 ft. (New pay in Main Pass Blk. 41 field.)

California Co. 1 State Lease 1922, Township 24s-30e. IP 368 BOPD, 9/64-in., 29.9°, GOR 724 cu. ft. per barrel, perfs. 11,113-25 ft. TD 11,480 ft. (New pay in Burwood field.)

Saint Mary Parish: Quintana Producing Co. 1 Alice C. Plantation & Refining Co., 61-15s-10e. Shutin gas well, no gage, perfs. 14,445 ft. (approximately). TD 14,840 ft. (New field.)

Vermilion Parish: Richardson & Bass 1 Amerada-Brookshire Unit, 5-12s-3e. IP 49 BCPD and 2,607 M.c.f. daily, ⅛-in., 41.1°, perfs. 15,982-16,012 ft. TD 16,010 ft. (New pay in Abbeville field.)

MISSISSIPPI

Wilkinson County: Rimrock-Tidelands, Inc., 1-A Baggs, 47-4n-3w. IP 100 BOPD, 7/16-in., 36°, perfs. 7,245-51 ft. (Wilcox). TD 7,615 ft. Elev. 206 ft., Wilcox 5,260 ft., base Baker shale 7,010 ft., Barksdale sand 7,242 ft. (New field—Rose Hill.)

SOUTHEAST NEW MEXICO

Lea County: Lone Star Producing Co. 1 Santa Fe, NE NW 30-9s-37e. IP 541 BOPD, 11/64-in., TP 640 psi., GOR 10, 44.6°, Devonian top 12,132 ft., perforated 12,173-85 ft. TD 12,188 ft. Elev. 4,015 ft.

OKLAHOMA

Alfalfa County: Barrett Petroleum Co. 1 Hague, C SE SE 22-27n-11w. IPF 22,580 M.c.f. of gas per day, 138 BDPD, 50° gravity. Red Fork sand 5,176-5,220 ft. TD 5,339 ft.

Barrett 1 Clarence Beltz, NE NE SE 31-27n-11w. IPF 2,060 M.c.f. of gas per day, 36 BDPD, 65° gravity. Basal Pennsylvanian 5,310-33 ft. TD 5,452 ft.

Caddo County: Magnolia Petroleum Co. 1 Franklin Youngblood, C SE SE NE 15-6n-10w. IPP 10 BOPD, 34.8° gravity. Hoxbar 8,751-79 ft. TD 10,109 ft.

Carter County: Skelly Oil Co. 18 W. Carney, 15-4s-2w. IPF 88 BOPD, 27° gravity. Sycamore 3,320-60 ft. TD 3,712 ft. New pay discovery in Hewitt pool.

Cleveland County: Fain Porter and Trice 1 French, SE NW SW 29-8n-1w. IPF 359 BOPD, dolomite 7,415-42 ft. Third Bromide sand 7,951-57. TD 7,968 ft.

Anderson-Prichard Oil Corp. 1 Allison Unit, 27-8n-2w. IPF 652 BOPD, 40° gravity. Bromide sand 7,900-05 ft. TD 8,919 ft.

Dewey County: Sinclair Oil & Gas Co. 1 Kune, C SW NE 11-17n-18w. IPF 201 BOPD, 48.5° gravity, 650 M.c.f. of gas per day, Oswego lime 9,124-9,246 ft. TD 14,467 ft.

Garvin County: Robert A. Hefner, Jr., 1 City of Pauls Valley, C SW NW SW 20-3n-1e. IPF 121 BOPD, 31.5° gravity. Unconformity sand 3,620-26 ft. TD 4,976 ft.

Grant County: Seneca Oil and Aberdeen Petroleum Co. 1 R. J. Early, NE NE 12-27n-7w. IPF 224 BOPD, 43° gravity. 4,930 M.c.f. of gas per day, Red Fork sand 4,960-74 ft. TD 5,085 ft.

Barrett Petroleum and Kay County Gas Co. 1 Lewis "B," NE SW NW 34-28n-7w. IPP 20 BOPD, 36° gravity. Miss. chat 5,023-44 ft. TD 5,073 ft. New pay in Southwest Wakita pool.

McClain County: Kroy American Oils, Inc., 1 Mary Thomas, NW NW SE 3-9n-4w. IPF 120 BOPD, (90 bbl. dist., and 30 bbl. of oil). 10,000 M.c.f. of gas per day. Bartlesville 8,320-50 ft. (gas and dist.), Hunton lime 8,612-30 ft. (oil). TD 9,890 ft.

Lincoln County: Apache Oil Corp. 1 Dingman, NW NW SE 23-16n-5e. IP 570 M.c.f. of gas per day. Red Fork sand 3,589-99 ft. TD 3,615 ft. New pay in Baker pool.

Logan County: Home Stake Production Co. 1-B Lakeview Unit "B," NW 33-16n-2w. IPF 816 BOPD, 228 BWPD, 40° gravity. Layton 4,552-57 ft. TD 4,900 ft. New pay in Guthrie Lake East pool.

Harper County: Magnolia Petroleum Co. 1 Odell, NW SW SE 1-25n-25w. IP 436 M.c.f. of gas per day. Hoover sand 4,228-40 ft. TD 7,500 ft.

Okfuskee County: Home Stake 1 Crawley, SW NW NE 36-10n-11e. IP 1,650 M.c.f. of gas per day, 340 BDPD, 52° gravity. Viola, 3,889-3,900 ft. TD 3,988 ft. New pay in Gregory pool.

C. Hildegrade 1 Hayden, SW SE NW 18-13n-10e. IPF 1,678 BOPD, 36° gravity. Bartlesville sand 2,292-2,308 ft. TD 2,991 ft. New pay in Haydenville District pool.

Osage County: Booth 1-A Osage, NW NW SE 4-24n-9e. IPF 108 BOPD, 36° gravity. Burgess 2,072-86 ft. TD 2,161 ft. New pay in Pershing pool.

H. H. Mundy and Doerrie 1 Osage, SW 5-26n-10e. IPP 25 BOPD, 31° gravity.

(Continued on page 201)

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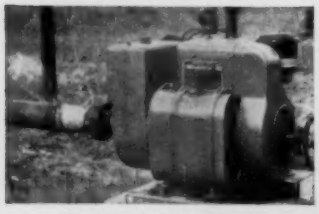

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A.A.P.G. Regional Meet Will Discuss Strat Traps and New Oil-Finding Tools

THE Intermountain Association of Petroleum Geologists of Salt Lake City will be host to the seventh annual meeting of the Rocky Mountain Section of the A.A.P.G., February 25-27.

The sessions will stress the dual themes of "Stratigraphic-Type Accumulations of Oil" and "Modern Exploration Techniques" in the Rocky Mountain region. A. I. Levorsen will give the keynote address, "The Discovery Challenge of the Rockies."

Registration, exhibits, technical sessions, and social activities will all be held in the Rainbow Randevu Auditorium in downtown Salt Lake City. Registration begins at 1 p.m. Sunday, February 24, and Monday, February 25. Meetings begin Tuesday and Wednesday, February 26-27.

Here is the tentative program:

Where authors are not listed, preliminary but not final approval for presentation has been given by company management.

Stratigraphic-Type Oil Accumulations

"Classification of Stratigraphic Traps in the Rocky Mountains," Bruce Curtis, Emerson Beekley, Robert K. Kirkbride, William S. McCabe, M. Dane Picard, and Frank Pritchett.

"Late Paleozoic Oil Accumulation in the Cottonwood Area, Eastern Big Horn, Wyoming."

"Stratigraphic Oil Accumulation in the Denver Basin," Harrison F. Murray.

"Oil Accumulation at Red Earth, Alberta," J. C. Sproule.

"Influence of Stratigraphy on Pennsylvanian Oil Production at Aneth and Other Paradox Embayment Oil Fields."

"Potential Stratigraphic Oil Accumulations in Upper Cretaceous Sands, Powder River Basin, Wyoming," John F. Partridge, Jr.

"Relationship of Rangely Field to Stratigraphic Trapping in Northwest Canada."

"Stratigraphic Trapping in the Redwash-Walker Hollow Fields, Uinta Basin, Utah," M. Dane Picard.

"Mississippian Sedimentation and Oil Fields in Southeastern Saskatchewan," Ralph W. Edie.

"Paleozoic-Mesozoic Oil Accumulation on the West Flank of the Sweetgrass Arch," Robert J. Weimer.

"Oil Accumulation in the Wolf Springs-Sumatra Area, Central Montana."

"Bisti Oil Field, New Mexico," Jack Q. Tomkins.

"Geology of the Pembina Oil Field, Alberta, Canada," A. M. Patterson and A. A. Arneson.

Modern Exploration Techniques

"Velocity Logging and Its Geological and Geophysical Applications," H. R. Breck, S. W. Schoellhorn, and R. B. Baum.

"Geological Interpretation of Argillaceous Sediments," Charles E. Weaver.

"Microfossil Zonation of the Mancos Group," Roberto Sarmiento.

"Photogeology, Its Past, Present, and Future," Eugene M. Shearer.

"Primary Structures in Some Modern Sediments," Edwin D. McKee.

"Late Cretaceous Cyclic Deposits in a Portion of the Book Cliffs of Eastern Utah," Robert G. Young.

"Fracture Analysis Studies," P. H. Blanchet.

"Regional Gravity Survey in Salt Lake and Utah Counties, Utah," Kenneth L. Cook and Joseph W. Berg, Jr.

"Trace Elements in Crude Oil of the Western States," H. J. Hyden, A. T. Myers, and A. T. Horr.

"Facies Approach to Reef Exploration in Central Alberta," John M. Andrichuk.

"Modern Methods of Paleoecology," R. C. Moore.

Successful Wildcats

(Continued from page 200)

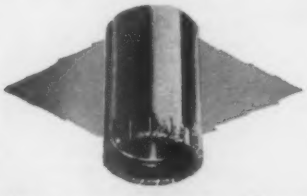
Big lime 1,526-39 ft. TD 2,035 ft. New pay in Whitehall pool.

Pure Oil Co. 1-A Myron Bangs, NE 20-27n-10e. IP 1,142 M.c.f. of gas per day, Layton 880-92 ft. TD 2,024 ft. New pay in Whitehall pool.

Pottawatomie County: Petroleum, Inc., 1 Vestal, SE SW NW IPP 180 BOPD, 35° gravity, Hunton 3,788-3,846 ft. TD 4,421 ft. New pay in Rover pool.

W. A. Delaney, Jr., 1 Rose, SW 2-8n-3w. IPF 108 BOPD, 40° gravity. Hunton lime 4,705-15 ft. TD 4,943 ft. New pay in East Brooksville pool.

Texas County: Panhandle Eastern Pipe Line Co. O-2 Beasley, C SW NE 26-3n-17eCM. IPP 8½ BOPD, 40° gravity.



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"You lousy bum— I knew blasted well you were diggin' a crooked hole!"

Miss. 6,741-50 ft. TD 6,800 ft. New pay in North Hardesty pool.

Woodward County: Union Oil Co. of California 1 McCormick, SE SE NW 14-22n-20w. IPF 25,000 M.c.f. of gas per day, 375 BDPD, 60° gravity. Morrow sand 8,233-43 ft. TD 8,491 ft. Discovery well of Southeast Woodward pool. First production in county.

WEST VIRGINIA

Mercer County: Plymouth district: United Fuel Gas Co. 2-8272 Sallie L. Bailey, elevation 2,542 ft., 273,000 cu. ft. gas after shot, Maxon sand 1,484 ft., gas 1,490-1,525 ft. TD 1,927 ft.

Randolph County: Dry Fork district: Columbian Carbon Co. 1239 U.S.A. Dept. of Interior, elevation 3,448 ft., 4,676,000 cu. ft. gas, chert 5,172 ft., gas 5,311-40 ft., and 5,420-86 ft. TD 5,522 ft.

PENNSYLVANIA

Indiana County, Young Township: New York State Natural Gas Corp. N-514 Florence Bodin, 348,000 cu. ft. gas after fracture, rock pressure 3,150 psi. Tully 6,710-6,820 ft., Onondaga 7,327 ft., chert 7,343 ft., gas 7,495 ft., Oriskany sand 7,491-7,519 ft. TD 7,565 ft.

TEXAS GULF COAST

Bee County: Head-Welsh 1 Seger, George O'Docharty Sur., A-49 (7 miles southwest of Beeville). IP 6,400 M.c.f. daily, open-flow potential, dry gas, perfs. 2,363-67 ft., and (dual completion) 33,500 M.c.f. daily, open-flow potential, dry gas, perfs. 2,658-62 ft. TD 2,840 ft. (New field.)

Kenedy County: The Texas Co. 4-A Yturria Land & Livestock, Share 1, San Juan de Carricitos Jose Narcisco Cab Grant. IP 19,000 M.c.f. daily, open-flow potential, GLR 280 M.c.f. per barrel, 59.3°, perfs 4,282-93 ft. (Miocene). TD 9,500 ft. (New pay in Monte Pasture field.)

Kleberg County: Arkansas Fuel Oil Corp. 1 Finble et al, Lot 17, Sec. 6, Kochs First Subd., Riviera Farm Lands, Gabriel Trevino Sur., A-232 (4½ miles northeast of Riviera). IP 52.56 BOPD, ¼-in., 37.6°, GOR 1,400 cu. ft. per barrel, perfs. 9,326-32 ft. (Frio). TD 9,610 ft. (Extension and new pay in May field.)

Sun Oil Co. 76-1 Baffin Bay, Tract 76 in Baffin Bay. IP 7,200 M.c.f. daily, open-flow potential, GLR 119 M.c.f. per barrel, perfs. 8,894-8,902 ft. TD 9,591 ft. (New pay in Riviera field.)

SOUTHWEST TEXAS

Brooks County: Standard Oil Co. of Texas 2 Braulia de Garcia 5, Mrs. Braulia G. de Garcia Sur., A-696. IP 2,900 M.c.f. daily, open-flow potential, GLR 18.8 M.c.f. per barrel, 56.5°, perfs. 7,767-77 ft. TD 8,500 ft. (New pay in Alta Mesa field.)

McMullen County: Kirkwood & Morgan, Inc., and Forney & Worrel 1 Hagist Ranch, BBB&C Sur., A-145 (12 miles north of Freer). IP 17,200 M.c.f. daily, open-flow potential, GOR 44,308 cu. ft. per barrel, 63.2°, perfs. 5,622-29 ft. TD 5,730 ft. (New field.)

Starr County: Appell Drilling Co. and Wiley P. Ballard, Jr., 3 Gladys E. Neblett (J. J. Howell), Share 6, Subd. B, Blk 1, El Benadito Sur., A-338. IP 5,100 M.c.f. daily, open-flow potential, 5 BC per M.M.c.f., perfs. 6,317-19½ ft., and (dual completion) 8,300 M.c.f. daily, open-flow potential, 6 BC per M.M.c.f., perfs. 5,582-94 ft. TD 6,322 ft. (Extension and new pay in unnamed field.)

EAST TEXAS

Henderson County: Humble Oil & Refining Co. 1 South Chandler Unit, Eli Hillhouse Sur., A-283, 5 mi. S Chandler. IP 140 BOPD, ¼-in., TP 775 psi., GOR 5,014:1, 55°, Rodessa perforations 9,441-48, 9,477-84, 9,493-99 ft. TD 10,625 ft., elev. 351 ft.

WEST TEXAS

Pecos County: El Cinco Oil Co. 1 W. L. Blaydes, 50-10-H&GN, 8 mi. SW Imperial. IP 33 BOPD, ¼-in., TP 60 psi. GOR 549, basal Permian (?) pay 5,140-5,293 ft. TD 5,475 ft.

Schleicher County: Alvin C. Hope 1 Upton & Upton, 20-H-GH&SA, 25 mi. NE Eldorado. IPP 60 BOPD, 34°, perforated 4,366-72 ft. TD 5,560 ft.

New Book

Rinehart Oil News Co., Dallas, announces publication of its 1956 Structure Maps of Texas Oil Fields reference book. Bound in two volumes, the 271-page third annual edition contains reproductions of structure maps as submitted during 1956 to the Texas Railroad Commission by operators for rulings on field discoveries, injection projects, and Rule 37 permits.

Exhibits are identified by district, county, name of contoured formation and interval, scale, and type of hearing, and are assembled and indexed by Texas Railroad Commission districts. Also included is a multicolored map showing districts by counties and an alphabetical list of counties by districts.

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He's a bird dog for facts . . .

Houdry Elevates A Team Man

THEODORE A. BURTIS is known among his friends as a "bird dog for tracking down facts." That's why he has gained a great reputation for doing things thoroughly.

For instance: He recently was invited to address a scientific gathering in West Germany. He not only wrote his paper on the selective hydrodesulfurization of gasolines, but he also brushed up on his German and delivered the paper in German.

Burtis will need all his fact-tracking talents in his new job. He now is president and board chairman of Houdry Process Corp. He succeeds C. G. Kirkbride who joined Sun Oil Co., but retained his place on the Houdry board. Strangely, the careers of the two men have paralleled for 15 years in the oil industry.

T. A. BURTIS
. . . Background touches all bases

How he works . . . Burtis has been around the Houdry organization for 10 years. And in the Philadelphia organization he is known as a team man.

During his span he has touched nearly all the bases. He has done stints in chemistry, engineering, design, economics, sales, and technical service. Like a juggler, he'll be tossing them all around as president.

A high-school teacher interested Burtis in chemistry and engineering. By the time he was graduated from high school his family was living in Pittsburgh. So he enrolled at Carnegie Tech and took his degree in chemical engineering in 1942.

About that time Claude Kirkbride came along recruiting talent for his research group at Magnolia Petroleum Co.'s laboratories in Dallas. Burtis was highly recommended to Kirkbride as a comer. The two struck it off at once, and the upshot was that Burtis went to Dallas.

The war had just started at that time, and Magnolia, like all other refiners, was straining to turn out aviation gasoline. Burtis was put to work doing research on HF alkylation. This work was interrupted when Burtis went off to Officers Training School. But a medical discharge cut short his army career, and he returned to civilian life. Kirkbride, meanwhile, had joined the Texas A. & M. staff, and Burtis followed him there to do graduate work. He took his master's degree in chemical engineering in 1946 and for a short time did research on tower packing and insulation for Owens-Corning Fiberglas Corp.

At home with Houdry . . . That work didn't last too long.

Kirkbride had moved east to join the Houdry organization and persuaded Burtis to come along. Burtis got the job of chief of the economics section in the research and development division. That was in 1947—and the start of a grand tour of the organization.

Burtis later held down jobs as director of development, supervisor of process engineering, and associate manager of research and development at the Linwood, Pa., laboratories.

When Kirkbride left, Houdry's directors tapped Burtis for the top spot for several reasons: Good judgment, an innate ability to work well with people, and a tough resistance to being shaken off a problem he has set his teeth in.

Burtis' training and experience admirably fits Houdry's business. The company pioneered in developing catalytic processing. It makes and markets catalysts and chemicals. Houdry also licenses the only single-step process using butane to produce butadiene for the synthetic rubber, textile, paint, and other industries.

Burtis holds a number of patents dealing with the desalting of crude oil and movement of solids in catalytic processing. He has published many technical papers on the design and economics of the catalytic processes.

Samuel C. Johnson, consulting geologist in Albuquerque, N. M., has joined the geological staff of Sahara Petroleum Co. in Alexandria, Egypt.

Personals

John E. Chance, civil engineer with Sun Oil Co., has resigned to open consulting engineering offices in Lafayette, La.

Joe E. Smith, exploration geologist for Sun Oil Co. in Beaumont, has joined Bryan Beck & Associates as senior geologist and manager of the geological department. Smith is a graduate of the University of Texas.

Guy Z. Moore has been named superintendent of El Paso Natural Gas Products Co.'s new styrene plant now under construction near Odessa, Tex. Moore joined the company recently in El Paso after working 3½ years for Foster-Grant, Inc., as technical superintendent of a large styrene plant at Baton Rouge, La.

Earl S. Neal, director of Imperial Oil, Ltd., has resigned to become London representative on Middle East affairs for Standard Oil Co. (N. J.). **L. D. Fraser,** general manager of marketing for Imperial will succeed Neal as a director. **C. T. Wright,** Imperial's deputy manager of marketing, has been named general manager replacing Fraser.

MANGELSDORF

Theodore A. Mangelsdorf, general manager of domestic refining for The Texas Co. since 1954, has been named a vice president of the company. Mangelsdorf formerly was superintendent of Texaco's Port Arthur, Tex., and Lockport, Ill., refineries. **Oscar John Dorwin,** vice president of the company since 1951 and general counsel since 1944, has been elected a director. He replaces **R. F. Baker,** executive vice president, who has retired from the board.

John Paul Jones, chief of industrial relations, manufacturing department, for Standard Oil Co. (Ohio) in Cleveland, has been given a 2-year loan assignment as assistant to the manager of employe relations for Iranian Oil Exploration & Producing Co. and Iranian Oil Refining Co. at Teheran. **Charles H. King, III,** senior staff assistant in industrial relations at Sohio's Lima, Ohio, refinery, will replace Jones in Cleveland. **Oliver J. Smart,** staff assistant at the company's Cleveland refinery, will replace King as acting industrial relations assistant to the refinery manager at Lima.

Personals

W. L. Durr, geologist with Continental Oil Co., has been transferred to Casper, Wyo., from Lewistown, Mont.

N. A. GASS

Neville A. Gass has been named chairman of British Petroleum Co., Ltd. Gass served as deputy chairman during the past year and has been a director since 1939. He joined B.P., then Anglo-Persian Oil Co., in 1919. Gass succeeds **Basil R. Jackson,** who resigned because of poor health. Jackson took over the chairmanship 9 months ago succeeding **Lord Strathalmond,** who had headed the major international company for 15 years. Jackson joined B.P. in 1921. He served as the company's representative in the United States from 1930 to 1935.

Kenneth Hunt, analytical chemist with Continental Oil Co. in Ponca City, Okla., has been promoted to senior analytical chemist for the company in Lake Charles, La.

Harold W. Stoneman, assistant manager of Imperial Oil Co.'s Edmonton division, producing department, has been transferred to the New York producing coordination department of Standard Oil Co. (N. J.).

J. Russell Harman, district production superintendent of Shell Oil Co.'s East Coalinga, Calif., district, has retired after 37 years with the company. He served as production superintendent at Bakersfield, Long Beach, Ventura, and Oilfields, Calif.

Warall J. N. Whipple, chief geologist for Southern Natural Gas Co., has been promoted to assistant manager of the production division and will keep the title of chief geologist for the division. Whipple joined Southern Natural Gas in 1952.

K. H. Shaffer, president of Standard Oil Co. of Texas, has assumed the duties of **Ralph G. McIntyre,** retiring chairman of the board and president of Pasotex Petroleum Co. and Pasotex Pipe Line Co. Shaffer will remain president of the company. McIntyre joined Standard Oil Co. of California in 1910. He transferred to the company's Texas subsidiaries in 1928. McIntyre was elected president of Standard of Texas in 1946 and became board chairman in 1955.

Lowell L. Elder and **Robert S. Ryan,** senior engineers with Columbia Gas System Service Corp., have been promoted to assistant supervisory engineers.

Herbert Geissendorft, district production foreman for Sinclair Oil & Gas Co. at Silsbee, Tex., has been promoted to assistant district production superintendent with Sinclair Canada Oil Co. in Calgary. **Stephen L. Drake,** assistant district production foreman at Odessa, Tex., has been promoted district production foreman in Calgary.

C. D. Miller, formerly executive vice president of Harper-Turner Oil Co., has joined Republic Natural Gas Co. as vice president. Miller was executive vice president in charge of exploration and production for British-American Oil Producing Co. before he joined Harper-Turner. **Ralph S. Euler,** senior vice president and director of Mellon National Bank & Trust Co., and **Edwin L. Kennedy,** partner of Lehman Brothers, have been elected directors of Republic Natural Gas. Kennedy is a director of Kerr-McGee Oil Industries, Inc., Murphy Corp., Gas Properties, Inc., and Distillate Production Co.

Robert E. Burrow, geologist for Sinclair Oil & Gas Co., has been transferred to Houston from Lafayette, La.

Larry L. Jones, formerly drilling superintendent for Kirby Oil Industries in Billings, Mont., has joined Hose-Austin Drilling Co. in the same capacity.

N. W. Engel, formerly district geologist for Superior Oil Co. in Denver, has been named assistant to the chief geologist in Los Angeles. **Russell Maurer** will replace Engel in Denver.

David R. Williams, Sr., of the original Williams Brothers contracting firm of Tulsa, and **I. C. Little,** Dallas, have been elected honorary members of the board of directors of the Pipe Line Contractors Association. Both were prominent in pipeline contracting for more than three decades.

Gifford H. Symonds has been named operations research coordinator in the economic analysis division of Esso Standard Oil Co.'s manufacturing department. Symonds joined Esso in 1929. He has been executive secretary of the company's manufacturing technical committee since 1948.

E. L. STEINIGER

HARRY JEFFRIES

C. J. ALLEN

W. H. MORRIS

Sinclair Reshuffles Top Management

SINCLAIR OIL CORP. has reorganized its top management through promotion of five executives. The move saw two men move into newly created posts of executive vice president and three others become vice presidents.

E. L. Steiniger, a director and vice president in charge of foreign crude oil operations, has been named executive vice president-operations. Harry Jeffries, vice president, is now executive vice president-administration. Jeffries was also elected a director succeeding A. E. Watts, who has resigned.

New vice presidents are C. J. Allen, executive vice president of Sinclair Refining Co.; W. H. Morris, president of Sinclair Pipe Line Co.; and O. P. Thomas, Sinclair Oil Corp. assistant comptroller.

Allen will be administrative assistant to P. C. Spencer, president of Sinclair. Morris will be executive assistant to Steiniger in operations, and Thomas executive assistant to Jeffries in administration.

As a result of the new executive line up the company's senior management group includes Steiniger, Jeffries, Spencer, M. L. Gosney, chairman of the board, and James E. Dyer, Sinclair Refining Co., president.

Promotion of Steiniger and Morris puts them in charge of a six-man operating committee which oversees crude oil and gas production, refining, transportation, marketing and research. Jeffries and Thomas head a coordinating group for finances, long range planning, budgets, accounting, purchasing, and personnel administration.

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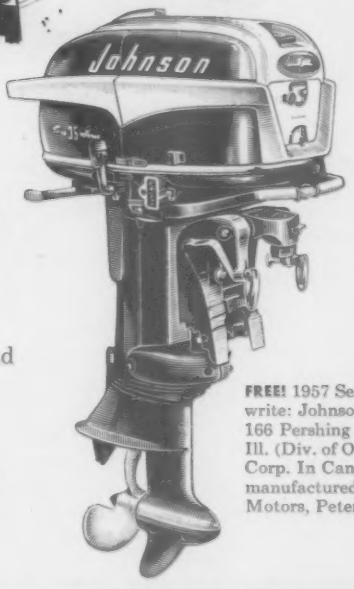

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Personals

R. W. Michaels has been appointed director of research for Wilshire Oil Co. of California. Michaels was formerly with Standard Oil Co. (Ind.).

Norman Willson has been named exploration manager of a new Canadian division office Ambassador Oil Corp. has opened at Calgary. He will direct Ambassador's operations throughout Canada. Willson joined Ambassador last December, leaving a post as general manager of Yankee Princess Oil, Ltd. Before this he was chief geologist for British-American Oil Producing Co. in western Canada.

Ray C. Fish, chairman of the board of Pacific Northwest Pipeline Corp. and president of Fish Engineering Corp., has been elected a director of Transcontinental Gas Pipe Line Corp.

John W. Warner, vice president and marketing manager of Tidewater Oil Co.'s central division, Tulsa, has retired. Warner joined Tidewater in Dayton, Ohio, in 1919. He was vice president of Tide Water Oil Sales Corp. and Tide Water of Oklahoma before Tide Water Associated Oil Co. became the parent operating company in 1936. He has been vice president of the parent company since 1943.

J. L. Tathwell, chief project engineer for Fluor Corp., Ltd., and **F. G. Crawford,** manager of project coordination, have been appointed managers of projects.

J. Herbert Sawyer of Esso Standard Oil, S.A. (N. J.), has been elected president of the newly formed Petroleum Club of Havana, Cuba. Other officers include **Henry L. Brandon,** vice president, Union Oil Co. of California; **Dr. Fernando Freyre de Andrade,** secretary, Freyre, Andrade y Montalvo; **Dr. Emilio Arango,** vice secretary, Nunez Mesa y Machado; **Thomas Ritter,** treasurer, Sun Oil Co.; and **Dr. Jorge Faz Vega,** assistant treasurer, Atlantic Refining Co. of Cuba. Directors are **R. C. Free,** Cuba California Oil Co.; **James W. Vanderbeek,** Cuban Stanolind Oil Co.; **Rolf Engleman,** Esso Standard Oil, S.A. (N. J.); **Paul J. Griffiths,** White Eagle International Oil Co.; **Henry W. Wassall,** consulting geologist; and **Earl Copeland, Jr.,** Cuba Petroleum News Digest.

New York Nomads Elect 1957 Officers

Maurice F. Delano, Jr., seated, second from left, has been elected 1957 president of the New York chapter of Nomads. Delano is with R. S. Stokvis & Sons, Inc. Other officers are, seated, left to right, Stewart D. Beckley, Beckley, Haltom & Hickman, senior regent; Delano; E. E. Andreason, Andreason-Lundberg Corp., vice president; Herb Maland, R. J. Eiche & Associates, Inc., junior regent. Standing are, left to right, Don E. Kircher, Gardner-Denver Co., secretary; E. W. Hoeppner, Hughes Tool Co., executive secretary; Hollis W. Haltom, Beckley, Haltom & Hickman, treasurer; Harold E. Lowrey, Continental-Emsco Co., assistant secretary; and John D. Evans, Jr., Lucey Export Corp., assistant sergeant-at-arms.

B. L. Smith, formerly partner in Cory, Webster & Smith, Wichita exploration company, has formed Javelin Oil Co. in Wichita for oil and gas exploration in the Oklahoma and Kansas areas.

Wayne E. Swearingen, chief engineer for Alex W. McCoy Associates, Inc., has been elected vice president for engineering. **Dr. Carl Moritz,** executive vice president, has been appointed chief geologist.

James D. Heinly has joined Atlantic Refining Co.'s research and development department as assistant development engineer.

Milton Ludwig has been named senior staff engineer by Standard Oil Co. of California. **W. R. Postlewaite** has been appointed staff engineer in mechanical design, engineering department, and **F. L. Maker** has been named senior staff engineer, engineering department.

DEATHS

Six were killed in the crash of a Sohio Petroleum Co. plane January 25 near Bryan, Tex. The dead are **Donald Crary,** manager of exploration for Sohio in Oklahoma City; **Mrs. Crary; Clyde Thompson,** geological trainee in the company's Houston office; **Mrs. Thompson; Jim Thornton,** Norman, Okla., editor of the company magazine; and **Robert C. Pomeroy,** Oklahoma City, assistant chief pilot for Sohio.

Walter Pearce Stine, 73, retired divisional superintendent for Gulf Pipeline Co., died January 23 in Beaumont, Tex. Stine began his career as a member of the engineering staff which completed the Panama Canal. He had been with Gulf Pipeline for 30 years.

Paul M. Paine, 76, Los Angeles consulting engineer and geologist, died January 29 at his home in Corona Del Mar, Calif. Paine started in the oil industry with Honolulu Oil Corp. in 1910, then joined Gypsy Oil Co. in Tulsa. He was later director of Union Oil Co. and vice president of Shell Oil Co. of California. In 1923 he became a consultant.

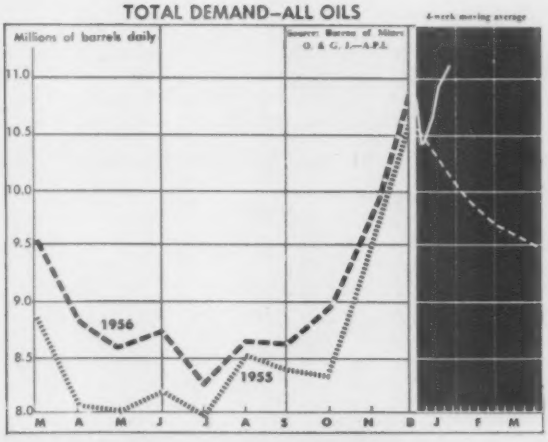
Charles W. Stewart, 69, Saratoga, Calif., retired president of American Bitumuls & Asphalt Co., subsidiary of Standard Oil Co. of California, died January 22 in Providence, R. I. Stewart retired in 1952. He had been president of American Bitumuls & Asphalt since 1948.

Harry J. Glauser, Sr., 61, president of Staytite Co., died January 16 in Houston. Glauser helped found Staytite in 1927.

Latest Figures . . . Industry Trends

A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	7,407,580	DOWN	29,095	UP	233,343
Crude stocks	256,278,000	DOWN	3,379,000	DOWN	2,586,000
Completions	1,096	UP	14	DOWN	89
Refinery runs	8,189,000	UP	69,000	UP	132,000
Gasoline stocks	193,248,000	UP	1,875,000	UP	14,301,000
Kerosine stocks	25,619,000	DOWN	1,923,000	UP	4,027,000
Distillate stocks	106,668,000	DOWN	7,756,000	UP	17,507,000
Residual stocks	39,531,000	DOWN	1,478,000	UP	1,180,000
Four-product stocks	365,066,000	DOWN	9,282,000	UP	37,015,000
Total imports	1,347,700	UP	318,800	DOWN	66,500



Export Demand on the Gulf Coast Is Creating a Dual Pricing System

MOVEMENT of fuel to the Gulf Coast from the Mid-Continent has been an important factor in the stability of the Group 3 fuels market.

If there had been no increase in export demand on the Gulf Coast for the past 2 months, both light and heavy-fuel markets in the Mid-Continent would be soft.

Early movement of residual fuel from Oklahoma refineries to ports on the Gulf Coast served as a prop for heavy-fuel prices in the fourth quarter of last year when low-sulfur No. 6 for northern movement was bringing about $2.00 a barrel.

The additional cost of expanding supply of residual fuel on the Gulf Coast is tending to create a dual pricing system. Resid from the Mid-Continent, moving to the Gulf Coast, reaches port with a price tag that limits the sale to export.

For Mid-Continent residual to be marketed on the East Coast would mean that the refiner would have to sell the fuel well below the market or the fuel would have to move at a big premium on the East Coast.

Here is the way costs add up. Heavy fuel with no sulfur guarantee can be found in the Group 3 area for about $2.40 a barrel for normal northern movement. If the suppliers will sell at the same price for shipment to the Gulf Coast, the buyer would have to add $0.72 for freight to shipping port. Cost of the tanker haul to the East Coast, New York Harbor area, would amount to about $0.98 at current spot rates. Even if nothing is allowed for terminal charges on the Gulf Coast nor for insurance and loss, the fuel would represent an investment of about $4.10 by the time it reached New York. Current quotations for barge deliveries of residual in the harbor range from $3.30 to $3.40 a barrel. The clincher is the fact that the price can't move much higher without a big market loss to coal.

These figures indicate that the residual moving from the Mid-Continent to the Gulf Coast is for export only. Also, as soon as the influence of abnormal European demand is removed, Gulf Coast and East Coast prices will return to a more normal spread.

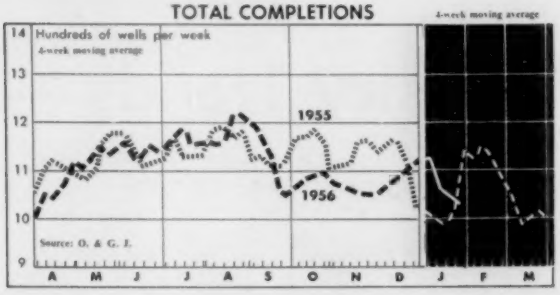
Recent movement of heating oil from the Mid-Continent to the Gulf Coast shows that there is no shortage of the material in the Group 3 market area. Further proof is the fact that the Mid-Continent refiner's realization from the Gulf Coast shipment is about in line with prices paid for similar material moved to normal northern markets by pipeline.

Mid-Continent distillate moving to the Gulf Coast for export is bringing half a cent over the low cargo quotation at the shipping port. But, the extra cost of moving fuel to tidewater reduces the refiner's net to the low Group 3 quotations.

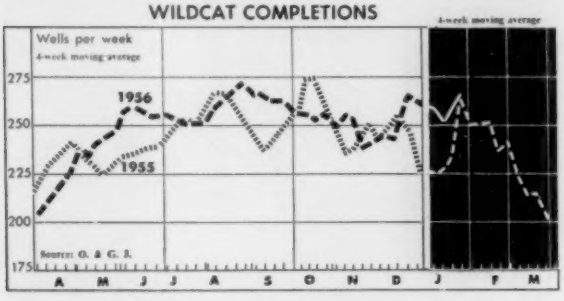
Last fall, some shippers hoped to cut transportation costs on shipments to the Gulf Coast by using back hauls of barges operating on the Mississippi River. However, northbound traffic on the river has dropped to the point where the upriver trip has become the back haul for many barges.

Since only light and heavy fuels have been moving to tidewater from inland refineries, there is some danger that abnormal refinery runs may build gasoline stocks high enough to break the market at the start of the big gasoline season and at a time when income from sales of fuel will be on the downgrade.

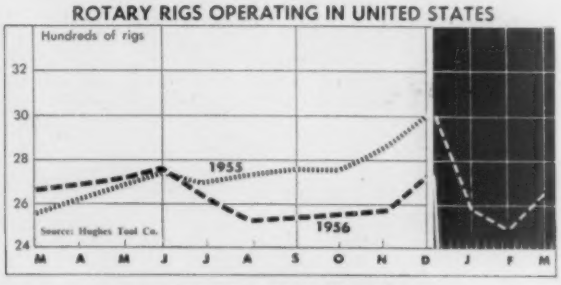
TOTAL COMPLETIONS



WILDCAT COMPLETIONS



ROTARY RIGS OPERATING IN UNITED STATES



ACTIVE ROTARY RIGS*

Area—	1-28-57	1-21-57	1-30-56
North Central and East	71	80	97
Southeast	33	36	33
Oklahoma, Kans., Ark., Mo.	394	395	454
Louisiana	438	443	410
North and East Texas-Panhandle	378	362	402
Gulf and South Texas	229	249	244
West Texas-New Mexico	461	446	472
Rocky Mountain	205	197	214
Pacific Coast	101	105	130
Total United States	2,310	2,313	2,456
Western Canada	239	229	211

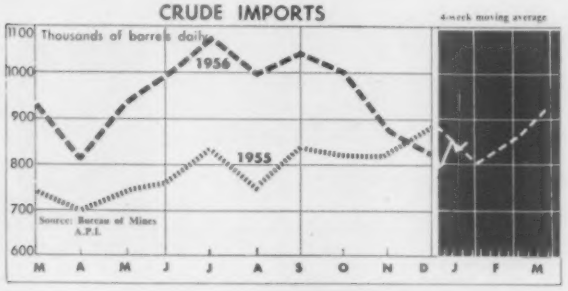
*Hughes Tool Co.

WEEKLY WELL COMPLETIONS . . . WEEK ENDED JANUARY 26, 1957

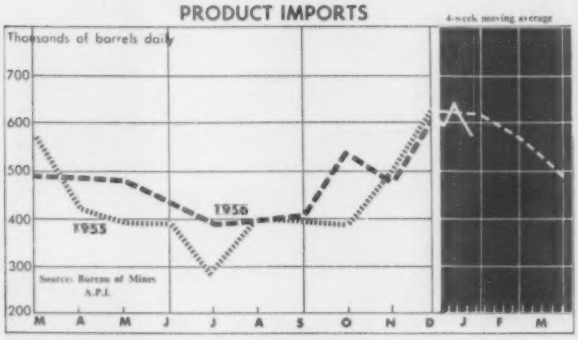
	Total of all wells					Cum.		Wildcat completions and discoveries					Cumulative total, 1957				
	Comp.	Oil	Gas	Dry	Footage	1957	1956	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
Ala.-Ga.-Fla.	0	0	0	0	0	1	8	0	0	0	0	0	0	0	0	1	1
Arkansas	26	22	0	4	85,654	87	56	1	0	0	3	4	2	0	0	10	12
California	46	33	0	13	198,215	170	156	0	0	0	9	9	2	0	0	45	47
Colorado	16	0	0	16	80,884	104	99	0	0	0	13	13	3	0	1	69	73
Illinois	67	33	0	34	154,331	185	356	1	0	0	13	14	1	0	0	47	48
Indiana	17	6	1	10	30,725	56	55	0	0	0	2	2	3	0	0	8	11
Kansas	80	26	11	43	286,249	308	332	2	0	1	17	20	9	0	1	57	67
Kentucky	41	14	5	22	74,623	127	162	1	0	0	9	10	6	0	1	24	31
Louisiana	104	72	5	27	697,379	294	368	3	2	4	11	20	8	4	7	33	52
North	53	42	1	10	157,326	136	154	0	0	0	5	5	0	0	1	12	13
South	37	20	4	13	396,343	122	171	1	2	4	6	13	5	4	6	21	36
Offshore	14	10	0	4	143,710	36	43	2	0	0	0	2	3	0	0	0	3
Michigan	9	2	0	7	28,002	31	44	0	0	0	5	5	1	0	0	14	15
Mississippi	5	3	0	2	43,643	19	47	1	0	0	2	3	2	0	0	6	8
Montana	9	6	0	3	47,879	33	35	0	0	0	3	3	1	0	0	10	11
Nebraska	13	5	0	8	78,560	53	69	0	0	0	8	8	2	0	0	34	36
New Mexico	57	32	14	11	244,028	142	172	2	0	1	2	5	5	0	2	15	22
Northwest	16	2	12	2	68,915	54	64	1	0	1	1	3	3	0	1	5	9
Southeast	41	30	2	9	175,113	88	108	1	0	0	1	2	2	0	1	10	13
North Dakota	4	2	0	2	30,402	23	17	1	0	0	1	2	2	0	0	7	9
Ohio	9	4	0	5	25,674	76	95	0	0	0	1	1	0	0	0	2	2
Oklahoma	151	88	10	53	522,147	560	721	3	0	0	11	14	12	2	0	59	73
Pennsylvania-New York	5	0	3	2	25,378	21	37	0	0	1	1	2	0	0	1	3	4
Texas	400	224	21	155	1,747,300	1,666	1,614	14	1	9	97	121	61	3	22	414	500
Southwest (1 & 4)	40	19	7	14	204,187	181	233	1	1	5	11	18	6	2	10	64	82
Gulf Coast (2 & 3)	62	19	11	32	407,136	205	236	1	0	3	15	19	5	0	9	55	69
East (5 & 6)	22	9	2	11	130,290	98	92	0	0	0	7	7	2	0	0	25	27
N. Central (7-B & 9)	149	91	0	58	432,648	603	583	6	0	0	40	46	34	0	2	177	213
West (7-C & 8)	94	56	1	37	457,102	447	376	5	0	1	24	30	12	0	1	79	92
Panhandle (10)	33	30	0	3	115,937	132	94	1	0	0	0	1	2	1	0	14	17
Utah	2	2	0	0	11,448	13	3	1	0	0	0	1	2	0	0	6	8
West Virginia	20	2	12	6	51,657	62	31	0	0	2	0	2	0	0	5	0	5
Wyoming	14	9	0	5	79,302	76	74	0	0	0	3	3	5	0	0	22	27
Miscellaneous (S. D.)	1	0	0	1	8,575	11	9	0	0	0	1	1	0	0	1	4	5
Total United States	**1,096**	585	82	429	4,552,055	4,118	4,560	30	3	18	212	**263**	127	9	41	890	1,067
Total previous week	1,082	559	71	452	4,566,714	....	....	36	3	10	260	309	97	6	23	678	804
Total Jan. 28, 1956	1,185	677	65	443	4,885,254	....	....	35	3	10	210	258	129	22	32	873	1,056
Cumulative 1957	4,118	2,147	293	1,678	17,016,748	....	....	....	....	....	....	....	....	....	....	....	....

Service wells included: Ind. 1, Kans. 2, Okla. 5.

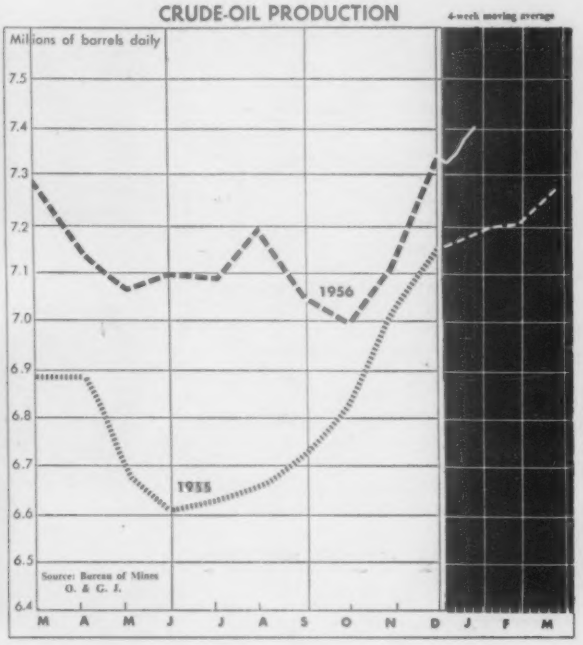
CRUDE IMPORTS



PRODUCT IMPORTS



CRUDE-OIL PRODUCTION



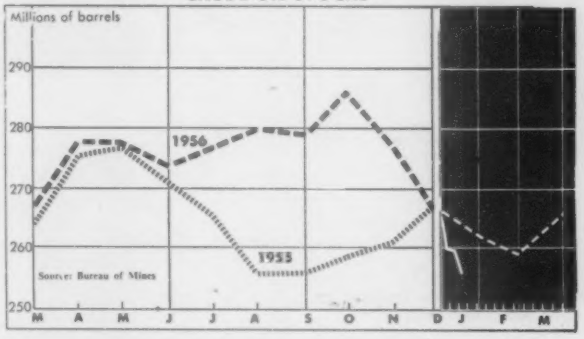
DAILY AVERAGE PRODUCTION FOR WEEK

	January 26, 1957			Jan. 19
	Crude oil	Lease condensate	Total	total
Alabama	11,525	.....	11,525	11,500
Arkansas	80,100	350	80,450	80,360
California	945,000	.....	945,000	944,500
Colorado	159,200	.....	159,200	159,800
Eastern	51,400	.....	51,400	51,000
Florida	1,300	.....	1,300	1,300
Illinois	226,100	.....	226,100	242,400
Indiana	31,300	.....	31,300	32,400
Kansas	†345,900	.....	†345,900	†340,150
Kentucky	47,800	.....	47,800	48,500
Louisiana	898,050	81,000	979,050	979,000
North	128,050	3,000	131,050	131,000
South	770,000	78,000	848,000	848,000
Michigan	26,000	.....	26,000	27,300
Mississippi	108,725	5,100	113,825	113,825
Montana	68,950	.....	68,950	68,000
Nebraska	37,850	.....	37,850	39,050
Nevada	100	.....	100	100
New Mexico	246,430	4,850	251,280	250,360
North Dakota	37,650	.....	37,650	38,300
Oklahoma	†606,700	.....	†606,700	†623,300
Texas	3,023,000	56,150	3,079,150	3,079,150
Dist. 1	55,500	575	56,075	56,075
Dist. 2	145,500	8,750	154,250	154,250
Dist. 3	432,500	26,000	458,500	458,500
Dist. 4	230,000	6,700	236,700	236,700
Dist. 5	39,500	550	40,050	40,050
Dist. 6	130,000	6,300	136,300	136,300
East Texas field	207,000	.....	207,000	207,000
Dist. 7-B	162,000	75	162,075	162,075
Dist. 7-C	168,000	4,600	172,600	172,600
Dist. 8	1,143,000	1,450	1,144,450	1,144,450
Dist. 9	209,000	850	209,850	209,850
Dist. 10	101,000	300	101,300	101,300
Utah	10,750	.....	10,750	10,280
Wyoming	296,200	.....	296,200	296,000
Others	‡100	.....	‡100	‡100
Total U. S.	7,260,130	147,450	**7,407,580**	7,436,675
Change from previous week, down			**29,095**	
Canada	†563,400	.....	†563,400	†563,200

Total U. S. production, January 1-January 26 ..... 192,580,210 bbl.
Same period last year (crude plus cond.) ..... *187,021,562 bbl.

*Includes 3,223,650 bbl. condensate. †Week ended previous Monday. ‡South Dakota.

CRUDE-OIL STOCKS



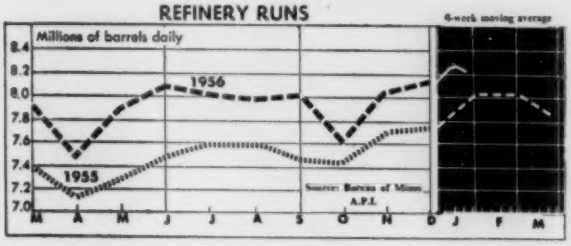
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

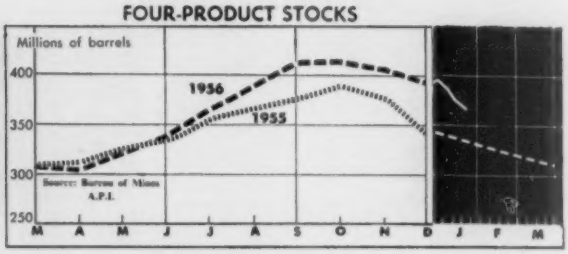
	1-19-57	1-12-57	1-21-56
Pennsylvania Grade	2,318	2,318	2,744
Other Appalachian	2,117	2,090	2,092
Illinois, Indiana, Michigan	10,887	11,321	9,055
Nebraska, North Dakota	2,042	2,222	2,171
Kansas	9,746	10,047	7,989
Oklahoma	22,782	22,885	21,478
Arkansas	2,680	2,728	2,068
Louisiana	18,588	19,198	15,809
North	2,782	2,853	2,683
South	15,806	16,345	13,126
Mississippi	2,633	2,656	3,098
New Mexico	8,015	7,717	7,811
Texas	113,294	113,973	123,783
East Texas proper	9,005	9,315	9,028
West Texas	53,264	53,381	58,206
Texas Gulf	21,992	21,684	24,419
Other Texas	29,033	29,593	32,130
Wyoming	16,378	16,751	15,850
Other Rocky Mountain	6,487	6,609	5,514
California	27,742	27,841	27,812
Foreign	†10,569	11,301	11,590
Total	256,278	259,657	258,864

*Bureau of Mines. †Includes 2,060,000 bbl. in California.

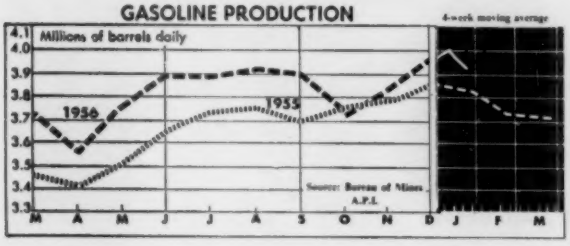
REFINERY RUNS



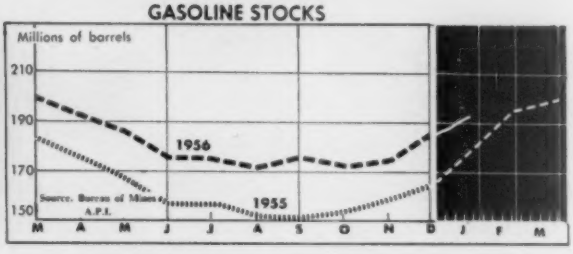
FOUR-PRODUCT STOCKS



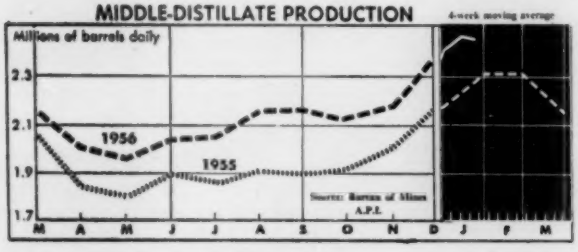
GASOLINE PRODUCTION



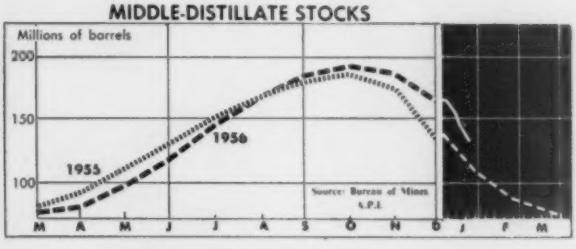
GASOLINE STOCKS



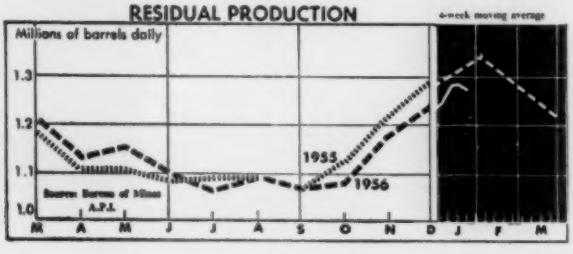
MIDDLE-DISTILLATE PRODUCTION



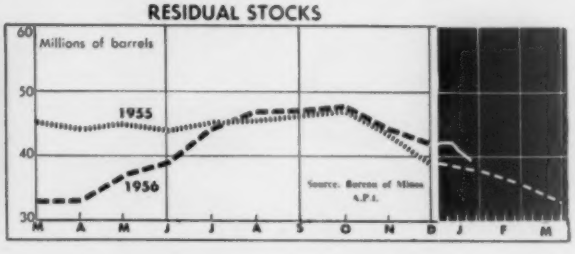
MIDDLE-DISTILLATE STOCKS



RESIDUAL PRODUCTION



RESIDUAL STOCKS



A.P.I. REFINERY REPORT, JANUARY 25, 1957

(Thousands of barrels)

District—	Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.	Stocks‡—Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, January 1956—Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.
East Coast	1,193	450.7	42.2	362.1	228.1	41,176	10,851	38,494	9,610	1,132	483.0	41.6	300.7	259.6
Appalachian:														
District 1	105	41.7	6.4	24.4	10.3	5,104	503	2,713	427	105	44.7	5.6	27.1	11.5
District 2	108	53.3	7.9	20.1	15.7	3,077	430	831	268	104	52.3	7.9	18.4	17.3
Ind., Ill., Ky.	1,442	752.6	58.4	333.3	208.3	35,393	5,270	15,779	4,985	1,492	761.7	75.9	336.3	222.9
Minn., Wis., Dak.	90	44.1	2.7	28.9	7.8	7,043	1,041	6,195	255	87	41.4	9.9	18.5	10.6
Okla., Kans., Mo.	708	397.4	11.7	190.6	39.7	17,982	1,213	10,482	1,335	708	407.1	17.1	190.1	43.7
Inland Texas	270	182.3	9.7	43.7	20.7	8,089	500	1,661	1,853	278	192.5	8.3	53.5	26.8
Texas Gulf Coast	2,014	863.9	129.6	556.9	228.9	26,783	2,775	8,758	5,628	1,908	895.3	138.3	527.5	251.2
La. Gulf Coast	711	352.0	68.4	211.0	64.4	11,969	1,587	5,176	1,741	697	313.0	62.7	175.7	58.1
N. La. and Ark.	102	40.0	8.0	25.6	11.3	5,126	747	2,496	256	94	36.7	8.7	21.3	8.6
Rocky Mountain:														
New Mexico	28	13.7	0.6	4.9	3.3	505	11	93	72	22	11.5	0.7	3.3	3.2
Other Rocky Mt.	290	130.1	2.0	63.4	41.0	6,418	369	2,548	949	269	131.2	4.9	66.6	44.0
West Coast	1,128	513.9	7.7	182.7	363.6	24,583	322	11,442	12,152	1,127	472.5	3.6	184.1	386.8
Jan. 25, 1957	8,189	3,835.7	355.3	2,047.6	1,243.1	193,248	25,619	106,668	39,531	8,023	3,842.9	385.2	1,923.1	1,344.3
Jan. 18, 1957	8,120	3,872.4	353.1	2,120.1	1,274.7	191,373	27,542	114,424	41,009	.....	.....	.....	.....	.....
Jan. 27, 1956	8,057	3,778.9	386.7	1,901.4	1,262.3	178,947	21,592	89,161	38,351	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Crude-Oil and Refinery Prices at Representative U. S. and Foreign Points

REFINED-PRODUCT PRICES

Following quotations are for refinery products in cents per gallon moving in interstate shipments on Wednesday each week unless otherwise noted. Crude-oil prices are per barrel at the wells unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):	
Regular (88 octane)	12.00-12.25
Premium (96 octane)	13.75-14.00
Gulf Coast (cargoes for coastwise or export movements):	
Regular (90 octane)	11.25-11.50
Regular (92 octane)	11.50-11.75
Premium (97 octane)	13.25-13.50
Premium (98 octane)	13.50-14.00
California (rack):	
Regular (84 octane)	12.6-13.1
Premium (93 octane)	13.6-14.1
Premium (96 octane)	14.6-15.1
Caribbean area (cargoes):	
Regular (87 octane)	10.875
Premium (93 octane)	11.75

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

NATURAL GASOLINE*

Group 3:	
Grade 26-70	5.0
Breckenridge:	
Grade 26-70	4.5

*If 26-70 natural is considered as 100 per cent, prices for lower-vapor-pressure grades increase 2.5 per cent for each unit drop in Reid vapor pressure down to and including 16-lb. Prices for grades below 16-lb. may vary slightly by areas or plants.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):	
★ Kerosine 42-44	10.625-10.75
★ Diesel oil (58 d.i. and above)	10.25-10.50
★ Distillate No. 1	10.25-10.50
★ Distillate No. 2	9.625-9.75
Gulf Coast (cargoes):	
★ Kerosine 41-43	10.50-11.00
★ Distillate No. 2	10.00-10.50
New York Harbor (barges):	
Kerosine 41-43	12.25
Distillate No. 2	11.65
Diesel fuel, 48-52 d.i.	11.95
Caribbean area (cargoes):	
Distillate No. 2	10.0

WAX (LB.)

Oklahoma (Group 3):	
132-135 A.m.p. (semi-refined) in tank cars	6.50
New York (export):	
126-130 A.m.p. crude scale (solid in bags or barrels)	7.35

★Denotes change from previous week.

RESIDUAL FUEL (BBL.)

Mid-Continent (Group 3):	
Residual fuel (max. 1% S)	$2.45-2.70
Gulf Coast (cargoes):	
Bunker C fuel	$2.75-2.90
New York Harbor (barges):	
Bunker C fuel	$3.30-3.40
Caribbean (cargoes):	
Bunker C	$2.55
California (rack):	
Bunker C fuel, Los Angeles	$2.60-2.75

LUBRICATING OILS

Mid-Continent (Group 3):	
150-160 bright stock, solvent refined, 0-10 p.p., 95 v.i.	25.5
200 vis. neutral oil, solvent refined, 0-10 p.p., 95 v.i.	22.25
Pennsylvania Grade:	
★ 145-155 vis. at 210, bright stock, 8 color, 25 p.t.	28
★ 200 vis. neutral (180 at 100°), 25 p.t.	26

CRUDE-OIL PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.	Mid-Cont.*	Gulf Coast Tex.†	West Tex.‡ N.M.	Wyo. (sour)
14-14.9	$2.52	....	....	....	....
15-15.9	2.56	....	....	....	$1.89
16-16.9	2.61	....	....	....	1.94
17-17.9	2.66	....	....	....	1.99
18-18.9	2.71	....	....	....	2.04
19-19.9	2.77	....	....	....	2.09
20-20.9	2.83	$2.75	....	$2.62	2.14
21-21.9	2.89	2.77	....	2.64	2.19
22-22.9	2.94	2.79	....	2.66	2.24
23-23.9	2.99	2.81	$3.44	2.68	2.29
24-24.9	3.04	2.83	3.46	2.70	2.34
25-25.9	3.08	2.85	3.48	2.72	2.39
26-26.9	3.13	2.87	3.50	2.74	2.44
27-27.9	3.17	2.89	3.52	2.76	2.49
28-28.9	3.21	2.91	3.54	2.78	2.54
28-29.9	3.25	2.93	3.56	2.80	2.59
30-30.9	3.29	2.95	....	2.82	2.63
31-31.9	3.33	2.97	....	2.84	2.67
32-32.9	3.37	2.99	....	2.86	2.71
33-33.9	3.41	3.01	....	2.88	2.75
34-34.9	3.45	3.03	....	2.90	2.79
35-35.9	3.49	3.05	....	2.92	2.83
36-36.9	3.53	3.07	....	2.94	2.87
37-37.9	3.57	3.09	....	2.96	2.89
38-38.9	....	3.11	....	2.98	2.91
39-39.9	....	3.13	....	3.00	2.93
40 and up	....	3.15	....	3.02	2.95

*Includes Oklahoma, most of Kansas, North Dakota, West Texas (sweet) and North Central Texas. †Low cold test Gulf Coast. ‡Sour.

Effective dates: California, January 17, 1957, east of California, January 3-January 10, 1957; Pennsylvania Grade, January 16, 1957.

Some crudes in North Central Texas and West Central Texas, are on the intermediate schedules.

FLAT PRICES

Louisiana:	
Bienville (distillate)	$3.05
Ville Platte	3.45
Texas:	
East Texas	3.25
Conroe	3.53
Van	3.13
Pennsylvania Grade:	
Bradford	4.88
Middle District	4.70
Southwest Pennsylvania	4.41
West Virginia	4.23
Buckeye Grade	4.23
Zanesville Grade	3.27
Illinois Basin	3.15
Canada:	
Leduc-Woodbend (flat prices D-2), D-3)	2.78
Redwater (Alta.) D-3	2.67
Smiley-Viking (Sask.)	2.44
Pembina	2.65

FOREIGN

Venezuela:	
Cumarebo, 48°-49.9°, Tucupido	3.75
San Joaquin, 40°-40.9°, Puerto La Cruz	3.37
Oficina, 35°-35.9°, Puerto La Cruz	3.05
Tia Juana medium, 26.5°-26.9°, Amuay*	2.55
Quiriquire, 16.5°-16.9°, Caripito	2.45
Lagunillas heavy, flat, Amuay or Las Piedras*	2.38
Bachaquero, flat, Las Piedras*	2.23

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

Middle East, Persian Gulf (cargoes, f.o.b. lifting port):	
Arabian, 36.0°-36.9°, Ras Tanura	$1.97
Iranian, 34.0°-34.9°, Bandar Mashur	1.91
Iranian, 34.0°-34.9°, Abadan	1.86
Iraq, 36.0°-36.9°, Fao	1.87
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.72
Qatar, 39.0°-39.9°, Umm Said	2.06
Middle East, E. Mediterranean:	
Arabian, 36.0°-36.9°, Sidon	2.69
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 37°-38°	2.60

TANKER RATES PER LONG TON

(Latest reported spot fixtures)

★ Gulf-U.S.N.H., clean (USMC+175%)	$7.84
★ Gulf-U.S.N.H., dirty (USMC+180%)	7.98
★ N.W.I.-U.S.N.H., dirty (USMC +150%)	6.75
★ N.W.I.-U.K., dirty (Scale+275%) (12ls. 11d.)	17.06
★ P.G.-U.K., dirty (Scale+327.5%) (340s. 3d.)	47.60

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LY 9-5361

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1955 MODEL 1000 Mayhew Combination Air and Water Drilling Rigs. Also 315 cfm Schramm Diesel Air Compressors. V. M. Shortes, Box 127, Lovington, New Mexico. Phones 6-7591 or 8533.

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3—Kellogg Adm. Fltg. Hd. 2200, 1800 Sq. Ft., 315#
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18—GR Fin Tubes, 73 sq. ft.

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1 Worth LTC-6 800 hp.
2 Clark RA-5 500 hp.
3 Penn Comps 100 CFM 500 lbs. 385 CFM 160 lbs.

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6—Bird Centrifugals 32 x 50, 24 x 38, 18 x 28.
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FOR SALE at Oklahoma City warehouse 1—used Worthington 4" x 10" power pump, figure #2424, frame size 10-H, serial #288142 fitted with 4⅞" liners, steel rods, less skid. Not separate valve pot type. Price $750.00. Cities Service Oil — Patridge — Bartlesville, Oklahoma.

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Diamond 3-4890

FOR SALE

1200'—13⅜" OD 54# 8 Rd. Thrd. J-55, Range 2, Seamless Casing
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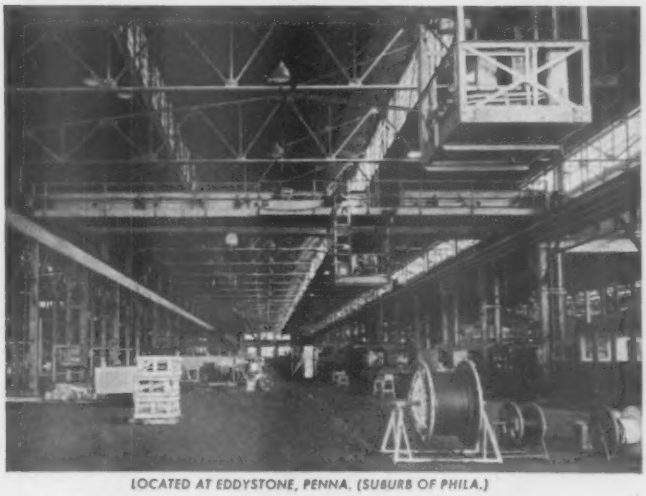
Box J-909,

The Oil and Gas Journal, Tulsa, Oklahoma.



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MODERN INDUSTRIAL ONE STORY STEEL BUILDINGS

BUILDINGS TOTAL 1,300,000 SQ. FT.
UNITS FROM 30,000 TO 725,000 SQ. FT.
MATCH-MARKED & LOADED F.O.B. CARS FOR RE-ERECTION

89 OVERHEAD TRAVELING CRANES

From 10 ton to 70 ton capacity. 40 ft. to 80 ft. span. Immediately available. Sold either separately or with building structure. These cranes are cab operated, 230 volt D.C. operation. Several of these cranes have auxiliary trolleys.

These buildings are ideal for practically any type of industry and are geared to efficient, economical operation. Divided to suit your specific requirements.

- Length from 173 to 800 ft.
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- 89 overhead traveling cranes.
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Detailed engineering data is available upon request. For additional information, write, wire or phone

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SEISMIC EQUIPMENT

24 trace, SIE seismic recording truck, shooting truck, geophones, cables, 2 way radios, blaster, etc. Everything necessary to conduct operations in the field. All equipment in first class order and subject to inspection. Lease purchase provision possible. Contact

A & E Exploration Co.,

236 Central Bldg., Midland, Texas
Phone MUtual 2-3960 or MUtual 2-8661

EQUIPMENT FOR LEASE

250 GROSS TON Fully Revolving Crane "AJAX." Available for lease charter on or about January 15, 1957. Certified by Coast Guard and ABS to work in Gulf of Mexico. Southern Scrap Material Co., Ltd., New Orleans, Phone AUdubon 3761.

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Major Co.; well to drill testing Devonian & Ellenberger zones. Should be next major success. Recommend close in royalty & leases. Data on request.

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Exploration 1918-1957 Engineering
Portales New Mexico

HELP WANTED

RECENT GRADUATE in Chemical Engineering. Position with independent oil company offers excellent opportunities for advancement and varied experience in gasoline plant operations. Prefer married man under 30. Send details of education, experience, personal background, and salary requirements to P. O. Box 3053, Dallas, Texas.

PRODUCTION SUPERINTENDENT—Contractor-Producer needs general superintendent production, principally gas, headquarters Guymon, Oklahoma. Engineering education preferred. Good opportunity for man with proper qualifications and not afraid of field work. Replies should include details of experience, education, and personal history, with expected salary. All replies confidential. Write Box J-893, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEERS

Chemical & Mechanical

Unusual opportunities for professional growth and development for engineers in natural gasoline department of a medium sized company.

Reply outlining personal history, work experience, and photo. All replies held strictly confidential.

P. O. Box 17003

Los Angeles 17, California

HELP WANTED

MARKET DEVELOPMENT. Growing organic chemical company expanding market development activities. Immediate opening. Chemical degree necessary. Petroleum and grease industry experience desirable. Eastern location. Please submit complete resume and salary requirements. Box J-903, The Oil and Gas Journal, Tulsa, Oklahoma.

HEAT TRANSFER ENGINEER

Young man 28 to 35 years capable of design, rating and sales of heat exchangers. Established fabricator located in S.W. City of 300,000.

Reply stating full particulars as to education, employment background and qualifications.

Salary commensurate with experience and ability. All replies kept confidential. Reply to

BOX J-904,
THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA.

OPERATING ENGINEER

For Writing Operating Manuals

To compose operating instructions for petroleum refinery, chemical and petrochemical plants. Will also assist in activities of New York Operating Department.

Graduate Chemical or Menchanical Engineer with minimum 5 years experience in performing similar work with petroleum refiner or contractor. This is a challenging position with an excellent opportunity for growth.

Please airmail in confidence complete chronological resume, including education and employment, salary history and salary requirements, to Personnel Department

HYDROCARBON RESEARCH, INC.

115 Broadway New York 6, N. Y.

HELP WANTED

GULF OIL CORPORATION
—ENGINEERS—

PETROLEUM **RESERVOIR**
GAS **MECHANICAL**
DRILLING **PIPE LINE**

Subsidiary operating in Venezuela has opportunities for engineers with/without experience. Salary commensurate with experience.

P. O. BOX #35
Bowling Green Station, New York 4, New York

PETROLEUM ENGINEERS

(Ages 30-38)

A major integrated U. S. oil company operating in Venezuela has outstanding career opportunities for RESERVOIR and PETROLEUM PRODUCTION ENGINEERS. Graduate petroleum, mechanical or chemical engineers who have a minimum of seven years of PETROLEUM ENGINEERING experience are invited to send a resume of personal data and work experience. Naturally, all replies will be held in confidence and interviews arranged for qualified candidates. Salary, including bonus, $16,500 - $18,000, depending on qualifications and experience. Excellent employee benefits, including home vacations with travel expenses.

Box 480
Dept. Y-21
New York 19, N. Y.

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GROUP LEADER—

with MS or PHD and 10 years experience in various phases of emulsion polymerization, rubber, surfactants. Eastern location.

DEVELOPMENT CHEMIST—

at Group Leader level for challenging work in petroleum production problems. Prefer an MS or PHD with 8 to 10 years experience. A knowledge of surfactants and emulsion chemistry and their application to the petroleum industry highly desirable. Texas location.

A progressive rapidly growing leader in the field of industrial chemicals offers these outstanding opportunities for your growth. For further information, send complete resumé to:

BOX J-907,
THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA.

HELP WANTED

ANDERSON-PRICHARD Oil Corporation has an opening in its Reservoir Engineering Section for a Junior Petroleum Engineer. Initial work location will be Oklahoma City. Applicants must have engineering degree; some field experience would be desirable. Please furnish a brief personal history including education and professional experience. All replies confidential. Address: Industrial Relations Department, Anderson-Prichard Oil Corporation, Liberty Bank Building, Oklahoma City, Oklahoma. Attention: Mr. D. F. Tver.

Petroleum Engineer
For Turkey

Large American oil company requires services of a young graduate engineer with some experience in mud and drill stem testing, coring and casing operations, and completions. Unmarried man preferred but will consider married man willing leave family in nearby city.

— WRITE —

Giving details, age, education and experience.

BOX 308 Z
RADIO CITY STATION
NEW YORK 19, N. Y.

HELP WANTED

FOREIGN EMPLOYMENT. List oil companies, drilling contractors, seismograph contractors, showing where apply foreign jobs. $5.00 cash. OIML Co., Box 2603, Tulsa, Okla.

DRAFTSMAN: Geophysical computing experience preferred. Ideal working conditions in permanent location. Major oil company security and benefits. Salary commensurate with experience. Write to Employee Relations Supervisor, Box 731, Tulsa, Oklahoma.

PETROLEUM ENGINEER with Master's Degree, or Doctor's in Chemical, Mechanical, or Petroleum Engineering for research and teaching in Petroleum Production Engineering at rapidly growing southwestern institution. Rank and salary open, twelve months employment possible, consulting work encouraged and available in immediate area. Applications will be kept confidential. Box J-902, The Oil and Gas Journal, Tulsa, Oklahoma.

LABORATORY MANAGER
For Core Analysis Laboratory
Rocky Mountain Area

Requires knowledge of basic core analysis and interpretation of data. Background of administrative supervision desirable. Salary open.

Chemical & Geological Laboratories
P. O. Box 278, Casper, Wyoming

HELP WANTED

CHEMIST: B.S. Degree: To supervise Control Laboratory and handle gasoline blending. Location—Southern City—150,000. Send complete record of education, experience and minimum salary expected. Write Box J-901, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED oil field supply credit man to headquarter in Tulsa. Must have had credit department experience with an oil field supply company in Oklahoma. Write in detail experience, qualifications, and salary requirements. Reply Box J-894, The Oil and Gas Journal, Tulsa, Oklahoma. Our employees know of this advertisement and all replies will be kept confidential.

PROCESS ENGINEER with thorough technical training and minimum background of eight years refining and hydrocarbon processing experience with special emphasis on catalytic reforming and petrochemicals. Send complete record of education, experience, and minimum salary expected. Write Box J-867, The Oil and Gas Journal, Tulsa, Oklahoma.

NATIONAL COMPANY has opening for man 25 to 35, married, with automobile. Experience in selling and/or working in oil industry in New Orleans area desired. Drawing account and commission. Write George Atkins, 1457 Lamar, Memphis, Tennessee.

THE POSITION YOU WANT: Oil Industry companies are looking for men to fill every conceivable kind of position. If you didn't find the position in this column that you are looking for, use a "Situation Wanted" classified advertisement to state your qualifications. Some company is probably looking for your ability. See box heading for classified rates or write The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEERS AND GEOLOGISTS

Your training and experience are your stock in trade. Sell your services where the technical opportunity and the return are best by *your* standards. A confidential inquiry today will focus fifteen years of world-wide experience on your background in terms of current possibilities and their potential for you.

Harold Allen, Recruiting Manager

TRANSWORLD MANAGEMENT CORPORATION

120 East Ocean Boulevard, Long Beach 2, California

"Representatives of Majors, Independents and Contractors Abroad"

REFINERY TECHNOLOGIST

If you are a Chemical Engineer with 3 to 5 years experience in refinery process engineering or operation and economic analysis and have an interest in consulting and technical service type work, you should investigate this unique opportunity to capitalize on your background and to participate in the growth of an expanding technical activity of a well known company allied to the refining industry. This position offers a wide variety of assignments, industry-wide contacts with refining and process companies, for using initiative and originality to increase responsibility. A midwest suburban location offers ideal professional environment. Send resume of qualifications to

Box J-891,
The Oil and Gas Journal,
Tulsa, Oklahoma.

BECHTEL

SAN FRANCISCO, CALIFORNIA

Offers engineers liberal relocation allowances from the point of employment to the engineering office in San Francisco. These allowances include transportation for you and your family plus moving allowances for your household furnishings.

PIPELINE ENGINEERS
SENIOR ELECTRICAL
SENIOR MECHANICAL

San Francisco opportunity for senior electrical or mechanical engineers with experience on oil pipeline and pumping stations or gas pipeline and compressor stations.

Send resume to Manager of Employment & Placement
Industrial Relations Division

BECHTEL CORPORATION

Engineers and Builders for Industry
220 Bush Street, San Francisco 4, California

PETROLEUM ENGINEERS

Graduate Engineers with experience in oil producing operations including pressure maintenance, secondary recovery, primary depletion. Initial assignment in New York Office in reservoir engineering and research section concerned with oil field development studies. Salary and position commensurate with qualifications.

Write giving full particulars regarding personal history and work experience.

Recruiting Supervisor, Box 199

ARABIAN AMERICAN OIL COMPANY
505 PARK AVENUE
NEW YORK 22, NEW YORK

SITUATIONS WANTED

GEOPHYSICIST: Ten years seis. experience, Texas, Oklahoma, Louisiana, desires challenging responsible situation. Excellent references. Box J-887, The Oil and Gas Journal, Tulsa, Oklahoma.

WOMAN, AGE 30, single, experienced in drilling and oil accounting, secretarial, and geological work, desires position in Amarillo, Texas. 500 Brown Building, Wichita, Kansas.

CHIEF PILOT & PILOT—long experience as crew team—5 years Trans-Atlantic service—Desire to make change. Presently employed by nationally known corporation. Top references. Box J-900, The Oil and Gas Journal, Tulsa, Oklahoma.

LANDMAN: 30, LLB, seven years experience, Texas, New Mexico, Louisiana, Mississippi. Desires situation with aggressive independent. Box J-912, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION SUPT.-Drilling Engr. for large drilling firm, 11 years prior major oil company experience desires to become affiliated with aggressive independent. Registered Petroleum Engineer. West Texas, West Coast, or Rocky Mt. area preferred. Box J-908, The Oil and Gas Journal, Tulsa, Oklahoma.

LANDMAN-ATTORNEY: For past four years, I have managed land department and handled all legal problems for moderate sized independent drilling 25 wells yearly. I have some geological background, am able to make preliminary evaluations, know how to trade on a deal or get out and scramble for leases. Qualified to handle title work, contracts, court work, many tax problems. Previous law firm experience. Age 31, married, honor graduate. Presently $7,000. Reason for change. Can make investment if desired. Box J-898, The Oil and Gas Journal, Tulsa, Oklahoma.

SUPERINTENDENT-ENGINEER, 44, administration, drilling, primary and secondary production experience all major southwest oil areas; desires responsible position with Texas independent. Capable of managing operations. Available February 1st. Box J-906, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER with diversified drilling, production, and administrative experience. Past 4½ years advanced supervisory capacity with management training. Desire challenging opportunity with producer or drilling contractor. Box J-905, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION SUPERINTENDENT. Twenty years varied production experience, Mid-Continent. 15 years supervisory, completions and workover. Presently employed. 1802 Seneca, Enid, Oklahoma. Phone ADams 7-2195.

PETROLEUM ENGINEER, 15 years field, office, reservoir, gas utilization experience. Former chief gas engineer large state agency. Declined new contract gas advisor Saudi Arab Government account war danger. Desires position government or financial institution advisor or government representative of operator or consultant. Write Hall, 1103 Summit, Austin, Texas.

REGIONAL Exploration Manager: Geologist, 37, 15 years land and geological experience in successful oil exploration. Now employed with large independent company. Geological, land and administrative knowledge to plan, organize, and direct aggressive exploration program U. S. or Canada. Desire similar or advanced position with aggressive company. No location preference. Box J-896, The Oil and Gas Journal, Tulsa, Oklahoma.

MAP CABINETS

END MAP-FILING WORRIES FOREVER! Kraftbilt Rollfiles keep rolled maps safe from dust, dampness, pilferers. Used by all major and hundreds of smaller oil companies. Send for new Catalog 1156-B, Ross-Martin Co., P. O. Box 800-A, Tulsa 1, Okla.

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JUST LIKE AN EXTRA PAIR OF HANDS. Kraftbilt 20-ounce cream-colored horsehide weights hug drawings or maps to the table while you work. Hand-sewn with heavy duty stitching, they're shot-filled and round in shape for ease of use and long life. Ask for Catalog 57-B, Ross-Martin Co., P. O. Box 800-A, Tulsa, Okla.

LEASE AND DRILLING BLOCKS

OIL PROPERTIES FOR SALE: Contact Gilchrist Drilling Company, Box 469, Abilene, Texas.

UTAH OIL LEASES on U. S. owned land in all counties where leasing active. 640 acre leases. 5 years and renewable 5 more. Free information. John L. Donahue, Empire Bldg., Denver 2, Colorado.

160 ACRE LEASE, Pittsburg County, Section 22, Township 2 N, Range 15 E. Semi-proven. 500 foot production. Sand wells. Sell one half interest. Have rig and tools. George Hedges, P. O. Box 136, Kiowa, Okla.

EIGHTY ACRE lease or more. Originally 320 barrel well offset one side, 150 bbl. other side. Bergen or Arbuckle lime. Near six new wells Section 18. One-half interest lease and well $4250.00, all $7500.00. Well completion, electric log, fracture and perforating supervised. L. Price, Coweta, Okla.

BUSINESS SERVICE

Delaware Corporations formed and serviced. American Guaranty & Trust Company, P. O. Box 487, Wilmington, Delaware

PRODUCTION FOR SALE

FOR SALE: Fifty stripper oil wells, fourteen hundred feet deep, near major company water flood. Box J-880, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCING ROYALTIES, Over-riding royalties and Production carefully selected. We specialize in producing properties. Banks will accept for collateral. Write P. O. Box 3688, Tulsa.

PRODUCTION WANTED

WANTED Oil production 100 bbls. and up, any size, prefer Okla., N. M., Tex., Colo. or Kan. B. Thurston, 1427 Princeton NE, Albuquerque, N. M.

WANT TO BUY—Oil Properties, settled or semi-settled production. 100 to 5,000 barrels daily in Oklahoma and Kansas. Contact Morris Sitrin, 1215 First National Building, Tulsa, Oklahoma.

WANTED

WANTED oil and gas production, royalties, reasonably priced. Unlimited finances available. Prompt action. Send full details. Box 231, Scarsdale, N. Y.

WANT TO PURCHASE stripper production that can be reworked and stimulated with fracturing. Box J-899, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION WANTED

Leases with good production and excellent reserves. Producing royalty also needed.

P. O. Box 12103 Preston Station,
Dallas, Texas.

SCOUTING

VENEZUELAN OIL SCOUTING AGENCY

Reports—maps—newsletter

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Mail: Apartado 3963
N. VanMiddlesworth
Phone: 54 48 02

The Alaska Scouting Service

Bi-weekly reports on
All-Alaska Exploration.

Address: Box 2278, Anchorage
Correspondence to:
5240 University Way Phone: KE 6584
Seattle 5, Washington

FOR RENT

FOR RENT: 30—15,000 gal. oil tanks and pump. For truck or rail delivery. Heated. Can be used as an oil terminal. Located at 43rd & Western. Industrial zone. Mr. C. Siegel, LAwndale 1-8570, Chicago, Illinois.

BUSINESS OPPORTUNITIES

OIL AND GAS FINANCING. Second mortgage loans; development drilling; oil payments purchased; bank loans arranged. If you are competent and honest and have a sound property, we can help you. Resources Recovery Company, Box J-910, The Oil and Gas Journal, Tulsa, Oklahoma.

INDEPENDENT equipment dealer representing twenty-four major manufacturers, oil field and industrial, desires corporate partner with minimum of $20,000.00. Excellent returns on investment. OLive 4-7510, Houston, Texas.

MOBILE HOMES, Office Trailers: Sales, leases, terms. MOBRO CORP., 9441 East Admiral Pl., Tulsa, Okla. Phone TE 5-0283.

Well organized, well established oilwell drilling contractor desires the management and supervision of oil properties in West Texas, Central Texas, and New Mexico. Can provide complete handling of oil properties from acquisition to production. No properties too small, none too large to handle. Inquiries from independents, groups, small or medium sized oil companies invited. Write, wire or call collect for further information.

MAKIN DRILLING COMPANY
P. O. Box 1628
Hobbs, New Mexico
Phone: EXpress 3-3141

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, BUREAU OF INDIAN AFFAIRS, Jicarilla Indian Agency, Dulce, New Mexico. Notice is hereby given that approximately 124,843 acres, more or less, of Jicarilla Tribal Indian lands in 53 tracts located in Sandoval and Rio Arriba Counties in New Mexico within the Jicarilla Apache Indian Reservation, will be offered for oil and gas leasing through competitive bidding to the highest responsible bidder for a cash bonus consideration in addition to stipulated rentals and royalties through sealed bids received on or before 3:00 P. M. (MST), February 28, 1957, when bids will be opened. Each tract containing approximately 3 to 4 sections each, is offered for lease separately. Details of the lease offering, and how and where to submit bids, may be obtained from the Superintendent, Jicarilla Indian Agency, Dulce, New Mexico, upon request.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Santa Fe, New Mexico. Notice is hereby given that approximately 885.40 acres of land in five parcels within the known geologic structure of certain fields in Lea, Rio Arriba and San Juan Counties, New Mexico, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 2:00 PM, MST, February 19, 1957, when bids will be opened. Details of the lease offering, how and where to submit bids, may be obtained from the Bureau's Land Office at Santa Fe, New Mexico. Douglas E. Henriques, Manager.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Land Office, Cheyenne, Wyoming. Notice is hereby given that approximately 321.24 acres of land in 5 parcels within the known geologic structure of the Kirby Creek field, Wyoming, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre through sealed bids on or before March 5, 1957, when bids will be opened. Details of the lease offering, and how and where to submit bids, may be obtained from the Land Office, Cheyenne, Wyoming. Edward Gillette, Acting Manager.

Good driving pays:

Training program cuts gasoline bill

LOS ANGELES.—Good driving habits pay off in gasoline savings.

Pacific Telephone & Telegraph Co. reaffirmed that aphorism recently in tests that solved a high-fuel problem. The company was averaging only 10.3 miles per gallon on the 36,000,000 miles annually its fleet of 4,000 vehicles travel.

Pacific Telephone launched a driver-training program. It covered these points: Don't race from lights. Shift to high as soon as possible. Drive at constant, low speeds. Don't hop around in traffic. Pace yourself in traffic. Push in the choke as soon as possible. Shut off the engine when parked. Use your brakes. Don't slip the clutch on hills and anticipate traffic so you cut down on braking.

Gasoline mileage, as a rseult, increased to 11.4 miles per gallon. This means an annual saving of 340,000 gal. — plus, less accidents, improved tire mileage, longer brake life, and fewer repairs.

Coal Loses to Gas

Heart of anthracite area scheduled for natural gas

WASHINGTON. — The success of natural gas in supplanting coal—even in the mining centers—is dramatized in Wilkes-Barre, Pa.

Presiding Examiner Richard N. Ivins of the Federal Power Commission has authorized Tennessee Gas Transmission Co. to invade the heart of the anthracite producing area. If no review of the decision is sought, it will become final.

T.G.T. would supply Scranton-Spring Brook Water Service Co. of Wilkes-Barre through a 27-mile, 12-in. line to be built by the utility. Peak-day demand for the Scranton division would be 5,531,000 cu. ft. the first year and 8,700,000 cu. ft. the fifth year. It would increase from 1,360,000 cu. ft. to 2,411,000 cu. ft. in the Wilkes-Barre division of Scranton-Spring Brook.

Opposing the proposed service are the Anthracite Institute, United Mine Workers of America, Fuels Research Counsel, Inc., and eight railroad carriers.

They objected to bringing natural gas from the Gulf Coast, and perhaps later from Canada into the coal region. The examiner, in his ruling, conceded that natural gas may displace coal and other fuels in the area, but added "the over-all benefits to be derived by the public as a whole from the availability of natural gas clearly outweigh any detriment that may result to the coal interveners or to any other affected group."

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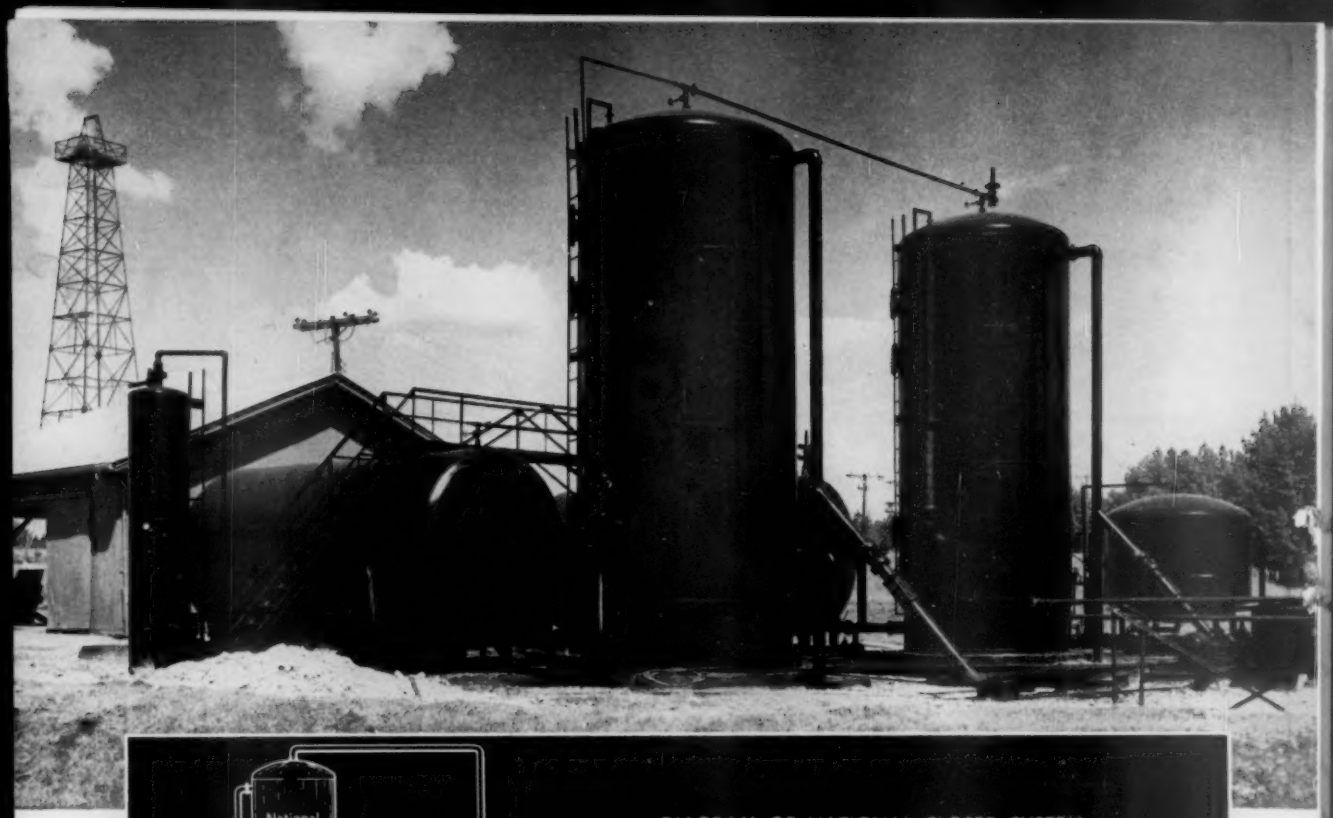
Youngstown Sheet and Tube Company 94



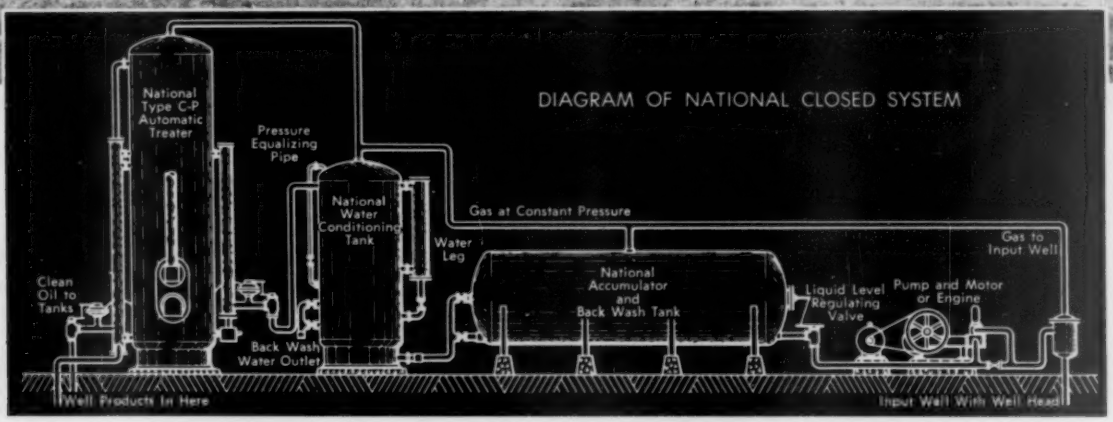


DIAGRAM OF NATIONAL CLOSED SYSTEM
National Type C-P Automatic Treater
Pressure Equalizing Pipe
National Water Conditioning Tank
Gas at Constant Pressure
Water Leg
Gas to Input Well
Clean Oil to Tanks
National Accumulator and Back Wash Tank
Liquid Level Regulating Valve
Pump and Motor or Engine
Back Wash Water Outlet
Well Products In Here
Input Well With Well Head

NATIONAL CLOSED WATER DISPOSAL SYSTEMS

. . . used for Pressure Maintenance

National Water Disposal Unit, Wesson Field, near Stephens, Arkansas.
2 10′ x 20′ horizontal accumulator and backwash
2 10′ x 20′ vertical conditioners
1 10′ x 5′ filter
1 2IF separator (used as gas scrubber)

NATIONAL ALL THE WAY

Field opened January, 1946—Bottom Hole Pressure 1299 PSI.

On July 1, 1948, BHP had dropped to 412 PSI. Water injection began September 1, 1948.

To date 36,758,358 bbls. of water have been returned to the formation and BOTTOM HOLE PRESSURE IS NOW 1357 PSI—58 PSI GREATER THAN ORIGINAL PRESSURE.

Oil Production to date—17,571,999 bbls.

Our Engineering Department welcomes inquiries concerning your water disposal problems.

It's a National®

NATIONAL TANK COMPANY

TULSA, OKLAHOMA

Dowell Acidizing Begins Here . . .

Tailoring the Right Acid Combination for Your Well

New chemicals to improve the results of acidizing treatments have been coming from Dowell research since 1932. And during that time Dowell service engineers have earned the practical knowledge that comes from long experience in doing a job well. From the moment the Dowell engineer begins working with you, you have the entire Dowell organization bending its efforts toward the solution of your problem.

What you get from Dowell, then, is the assurance that *no one* has had more experience in oil well acidizing, and that *no one* has a more complete line of acidizing chemicals.

Because of this background, Dowell can approach every well individually. The proper combination of acids and addition agents is tailored to give maximum results in your particular well. Dowell has the years of service, the experienced man power, and the wide range of chemicals needed to give you the best possible job. Dowell Incorporated, Tulsa 1, Oklahoma.

Services for the oil industry

DOWELL

A SERVICE SUBSIDIARY OF THE DOW CHEMICAL COMPANY

YOUR GUARANTEE OF PERFORMANCE

In the oil fields of the world the HUGHES trademark has been accepted as a guarantee of performance . . . *consistent, dependable performance* — for almost a half century. Through intensive and aggressive research, in the laboratory and in the field, HUGHES is continuing to advance the quality and performance of its products . . . worldwide.